Original Articles.

THE TREATMENT OF SYPHILITIC DISEASES OF THE CENTRAL NERVOUS SYSTEM BY INTRAVENOUS INJECTIONS OF SALVARSAN.*

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This work, started in August, 1911, has been conducted exclusively in the ambulatory neurological clinic of the Massachusetts Genral Hospital. It has been impossible to utilize the wards owing to the limited accommodation of this department, except for the recovery from lumbar punctures, which were performed as a control to treatment. This rendered the investigation more difficult; but the results fully justify this means of treatment and may show others, situated in the same position, that ideal hospital facilities are not absolutely indispensible. An added objection to the "outpatient treatment" lies in the personnel of the clinic, which is composed to a large degree of people of more or less shiftless character. Because of this fact, a large percentage of our patients have disappeared. The fact that it has been impossible to trace such individuals is not only a waste of effort, but injures the value of such statistics by limiting the number of cases.

Appreciation is due to Dr. E. W. Taylor, Chief of Service of the Neurological Department, for stimulating advice and encouragement and to Drs. Henry C. Baldwin and Walter E. Paul, Neurologists of the Massachusetts General Hospital for valuable help in conducting this investigation. The complement fixation reactions, without which the work would have been of little value, have been performed by the Pathological Department under the guidance of Dr. James H. Wright, Director of the Pathological Laboratory.

This paper is in no wise a neurological treatise, but consists of a review of the definite results of a specific form of treatment upon diseases of the nervous system, the syphilitic character of which has been established in the light of our present knowledge. Erb[1] in 1881 suggested the connection existing in a vast majority of cases between tabes dorsalis and syphilis. But it was not until the discovery of the Spirochete pallida by Schaudinn and Hoffmann[2] in 1905 and that of the specific serum reaction by Wassermann[3] in 1906 that the definite connection between these diseases became an established fact.

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It is not within the scope of this paper to discuss the varied forms of treatment for syphilitic diseases of the nervous system. The consideration is limited to the effect of salvarsan.

The results of treatment have been most varied. Leredde,[4] Ljass,[5] Collins and Armour,[6] Wechselmann,[7] and others have reported most favorable results. But as Jadassohn[8] points out, optimistic findings must be reviewed with great scepticism for two reasons. In the first place natural remissions are not infrequent in such diseases, especially in general paresis. Secondly, the enthusiasm resulting from the use of a new and much lauded drug is bound to have a beneficial result when employed in a chronic disease of long standing. Moreover, it is very common to see improvement in such cases from the use of any form of therapy which is attempted for the first time.

The benefits which have been witnessed in this group of cases is, however, of long standing and is maintained during a prolonged period during which the patient has received no treatment. As a further control, the serum and spinal fluid have been examined before and after treatment and, in as many cases as possible, at a period of at least six months after the last injection. These facts will be enumerated in detail in their proper order.

TABLE I.

CASES UNDER OBSERVATION IN THE NEUROLOGICAL CLINIC OF THE MASSACHUSETTS GENERAL HOSPITAL, AUGUST, 1911, TO DECEMBER, 1913.

Group.	Cases.	Treatments.	Lumbar Punctures.	Serum Tests.
Class A	24	107	42	63
Class B	6	27	4	14
"Spinous Cases" before spinous treatment	7	25	11	8
Lost cases	14	36	11	16
One injection only (lost)	9	9	6	9
Non-syphilitic	4	15	3	6
Total	64	219	87	116

The table shows the work performed in the clinic during the year and a half that new cases were received for this work. The lumbar punctures were performed to a large extent by Dr. James B. Ayer. In every instance he has enumerated the cell-content of the fluid and in some doubtful cases has carried out the Proteid Reaction. The technique of the "Wassermann reactions" has been uniform. The sheep corpuscle-rabbit-haemolytic system with a beef heart antigen has been employed.

The statistics are drawn from Class A, which consists of 24 patients who, having been followed for from 12 to 28 months, have reported within the last two weeks; Class B, consisting

of 6 patients, observed from the start, who have reported not later than June 1st, 1912, and lastly, a group of private patients as follows:

TABLE II.

PRIVATE PATIENTS.

	Cases.	Treatments.
Followed	19	62
Lost	8	9
Total	27	71

The entire group shows an aggregate of 91 patients, who have received 290 treatments. Attention is limited, however, to the three above mentioned groups with a total of 49 patients, with especial attention to Class A which has been controlled with much greater care and has been followed for a longer period than the others.

ETIOLOGY.

The syphilitic etiology has been demonstrated in 28 of the 30 cases of classes A and B, by means of history, complement fixation reactions in blood or spinal fluid, and by proteid reaction or cell-count in the latter. In one of the remaining an error in technique prevented an absolute conclusion, although the results throw much more than a suspicion on syphilis as a causal factor. The last case alone was absolutely unproved. For the sake of simplicity, the cases are divided into the following three classes: Tabes, General Paresis and Syphilis of the Central Nervous System.

TECHNIQUE.

Owing to the fact that our patients were forced to return to their homes following their injections, it was thought wise to administer small doses of salvarsan. With only rare exception 0.3g. salvarsan, in neutral solution, in 125 cc. of freshly distilled salt solution was introduced through the Schreiber needle, by means of rubber tubing attached to a 25 cc. Burroughs and Wellcome glass syringe, into the median vein. The ordinary means of asepsis were preserved. Care was taken not to introduce the fluid too rapidly and not to allow any of the drug to escape into the subcutaneous tissues. The use of such a small dose is considered inadvisable by Swift and Ellis,[9] but seems perfectly justified under the existing conditions.

CLINICAL RESULTS.

The accompanying table illustrates the clinical results in the simplest terms possible.

TABLE III.

Tabes Dorsalis:

	Class A	Class B.	Class C.	Total.
Improved	12	2	8	22
Moderately improved	1	0	0	1
Slightly improved	1	1	2	4
Not improved	3	0	2	5
Total cases	17	3	13*	32

* One case at present under treatment.

General Paresis:

	Class A	Class C.	Total.
Improved	1?	1	2
Not improved	2?	1	3
	3	2	5

Syphilis of the Central Nervous System:

	Class A	Class B.	Class C.	Total.
Improved	6	3	5	14
Slightly improved	1	0	0	1
Not improved	0	0	0	0
Total	7	3	5	15

Under the heading of tabes are classified three cases in whom there is a question of the existence of general paresis. Of these three, one alone has shown improvement. The other two, V and XIV, are suffering from disturbed mental states which have shown no change under treatment. The latter represent two of the three unimproved tabetic cases in Class A. The remaining individual (XI) is one with a long standing degenerative process in whom no good results from treatment could be demonstrated. The two unimproved cases in Class C (Nos. 384 and 558) fall into the same category as that just mentioned. The final results in tabes in this group show improvement in 27 cases or 84% and no improvement in 5 or 16%. Of the five unimproved cases of tabes, four have remained stationary and one has advanced. These figures include the two cases of questioned general paresis above mentioned. In no instance was any change in mental state noted in the latter disease. In one (VI), where that diagnosis was considered as possible, there has been a marked amelioration of distressing tabetic symptoms and in another (No. 445) there was decided improvement in strength on the side which had suffered paralysis. On the whole, the results from this small number of cases of general paresis are anything but encouraging. The reverse is true in cases of syphilis of the central nervous system. There, one hundred per cent. of improvement was shown in this group; and in only one instance (XVIII) could the change be called slight. The latter, a spastic paraplegic, complained simply of difficulty in locomotion. That a relief from this could not be considerable is not very surprising.

In addition to the failures in these tables and reviews, six cases have failed to show as much improvement as desired. Of these one had received two intra-venous injections, one three, three five, and one six. Two of these showed

moderate, but insufficient improvement; four showed not much of any change. All six were placed upon serum treatment. The results of this work are reported by Dr. Ayer.

The improvement in symptoms is a matter of considerable interest.

TABLE IV.

	Tabes.	Syphilis of C. N. S.	Total.
General Health and Strength:			
Marked improvement	17	10	27
Slight improvement	4	1	5
	21	11	32
Lancinating Pains:			
Improved	17		17
Apparently dispelled	8		8
	25		25
Ataxia improved (apparently from added strength)	8		8
Eyesight improved (diplopia, etc.)	4	4	8
Headache relieved	3	5	8
Vertigo relieved	3	2	5
Paralysis relieved	0	9	9
Gastric crises relieved	2		2
Urinary Control:			
Improved	1	0	1
Apparently recovered	0	1	1
	1	1	2
Anesthesiae improved		4	4

It will be seen from the accompanying table that improvement in general condition and strength and gain in weight is nearly a constant result in all improved cases. The relief of lancination pains is also a most common and striking result of a thorough course of treatment. In many instances, the entire disappearance of such symptoms has been noted—in all eight in number. The relief of ataxia and improvement in gait is no doubt in most instances due to increased physical strength. Headache in syphilis of the central nervous system is almost always dispelled by the use of salvarsan. It might not be out of place to give a very brief review of a few striking examples of the relief of symptoms.

CASE 1. Helpless woman, suffering from syphilitic ataxie paraplegia of five years' duration. Urinary incontinence and lancinating pains for the last six months. Following treatment she has improved steadily. She is now doing all her own housework and never uses the cane when in-doors. She has gained 28 pounds and has no pain and no urinary incontinence. Her improvement has lasted for over a year.

CASE 3. Tabes, of five years' duration. Patient had severe lancinating pains and described himself as a cripple. Now he has no pains and "gets about without his cane." His improvement has been maintained for over six months.

CASE 8. Tabes, of nine years' duration. Patient suffered from lancinating pains, gastric crises and urinary incontinence. Following treatment, all of these symptoms disappeared and have not returned during the last year. For the last eight months she has worked (dressmaking) for eight to nine hours daily.

CASE 16. Syphilis of the central nervous system (basal). Patient had suffered for a year from diplopia, headache and vertigo, nausea and ataxia. Two months following the last injection, *i.e.* March, 1912, she was perfectly well. There has been no return of symptoms. She is now working five hours daily.

CASE 19. Syphilis of the central nervous system (spinal). Patient was suffering from an acute, advancing paraplegia. There was well-marked paralysis and pain in the right leg. The left was becoming weak. Urinary incontinence. Nine months after his last treatment the right leg is much stronger and free from pain. The left leg is absolutely normal. Bladder incontinence remains the same, however. Marked improvement in general condition.

CLASS C.

No. 213. Syphilis of the central nervous system. Right-sided hemiplegia with difficulty of speech. Headache. Duration of symptoms two weeks. Following treatment all the signs and symptoms began to clear. Now, two years later, he is "as well as ever."

No. 517. Syphilis of the central nervous system. Cerebral thrombosis. Complete left-sided paralysis. This had persisted for a week without much improvement. Following treatment he began to improve at once and now (six months after his seizure) he is as strong as before.

It is, of course, impossible to state what would have been the progress of cases 213 and 517 without treatment. The results are very suggestive, however.

No. 326. Syphilis of the central nervous system. Headache, diplopia and numbness of legs of a year's duration. Patient was such a sufferer that she was incapacitated. Following the last injection all symptoms disappeared and for the last ten months she has done all her own housework.

No. 511. Syphilis of the central nervous system. Headache and transient diplopia for three years. Hemianesthesia and hemiparesis for six months. His strength and sensation returned gradually during his course of treatment. Before his last injection he reported that he had just "chopped down a tree one foot in diameter." His improvement has been sustained for the last six months.

No. 334. Tabes, of one to two years' duration. Lancinating pains, gastric crises and bladder disturbances. Pains and gastric symptoms responded almost immediately to treatment. Now, seventeen months after his last treatment, he feels perfectly well. No return of old symptoms, no new symptoms developed.

This brief case review presents simply the most striking clinical results. Not all symptoms are relieved in every patient and in the five noted in Table III no improvement of any note could be found. The six cases placed on serum treatment should also be considered as unsuccessful. In spite of the extensive improvement in symptoms, not a single change in physical signs has been discovered, save in regard to

biological and cytological changes about which mention will be made at once.

BIOLOGICAL AND CYTOLOGICAL CHANGES.

The accompanying table, based upon Class A, shows the changes that have taken place in the complement fixation reactions upon blood and spinal fluid and in spinal lymphocytosis. In many intances, patients have refused to be submitted to lumbar puncture, after suffering enough reaction from their first to incapacitate them for work 24 to 48 hours.

Seventeen of the 24 cases of Class A show changes in the serum or spinal fluid fixation reactions or cells counts. Spinal fluids show changes in 10 or 42%; blood in 9 or 38%. Both are altered in two cases. This shows a high percentage of physical alteration due very evidently to the treatment and persisting in many cases for months after the last injection. The most striking conclusion from these figures is obtained from a comparison of these biological and cytological changes with the clinical results already referred to. See table VI.

TABLE V.

	Before Treatment.			After Treatment.			9 to 15 Months After.			
	Blood.	Sp. Fl.	Cells.	Blood.	Sp. Fl.	Cells.	Blood.	Sp. Fl.	Cells.	Improvement.
I	++++	++++	25	—	0	14	—	—	3	Sp. Fl. ++++ 25 to 0 — 14, later 3 cells
II	++++	++++	90	++++	—	—	++++	++	36	Sp. Fl. ++++ 90 to ++ 36 cells
VI	0	++?	110	—	++++	110	0	—	18	Sp. Fl. ++++ 110 to 18 cells
VIII	++++	—	—	+	0	1	++	—	0	Blood ++++ to ++
IX	++	—	—	—	—	—	±	—	—	Blood ++ to ±
X	0	0	310	—	0	5	0	—	—	Sp. Fl. 0 — 310 cells to 0 — 5 cells
XII	0?	++?	60	0	++++	35	0	0	29	Sp. Fl. ++++ 60 and 35 to 29 cells
XIII	0	0	120	—	0	15	—	—	—	Sp. Fl. 0 — 120 cells to 0 — 15 cells
XIV	++	—	—	0	—	—	±	—	—	Blood ++ to 0 and ±
XV	++++	—	—	+	—	—	—	—	—	Blood ++++ to +
XVI	±	0	30	—	0	6	0	—	—	Blood ± to 0; Sp. Fl. 0 — 30 cells to 0 — 6 cells
XVII	0	++++?	30	—	0	3	0	—	—	Sp. Fl. ++++? 30 cells to 0 — 3 cells
XIX	0	—	27	0	±	2	0	0	4	Sp. Fl. 27 cells to 0 — 4 cells
XX	++++	++	110	—	—	—	0	—	—	Blood ++++ to 0
XXI	++	—	—	++	0	1	0	—	—	Blood ++ to 0
XXII	++++	++++?	360	0	—	—	0	0	123	Blood ++++ to 0; Sp. Fl. ++++? 360 cells to 0 — 123 cells
XXIII	++++	+	7	0	—	—	—	—	—	Blood ++++ to 0

Abbreviations: ++++ = strongly positive. +++ = positive. ++ = moderately positive. + = weakly or slightly positive. ± = suggestive. 0 = negative. — = test not performed.

TABLE VI.

Case.	Blood Imp.	Sp. Fl. Imp.	Clinical Result.
I	O	+	Improvement
II	O	+	Improvement
III	O* (neg.)	—	Improvement
IV	O (neg.)	O	Moderately imp.
VI	O (neg.)	+	Improvement
VII	O (neg.)	—	Improvement
VIII	+	—	Improvement
IX	+	—	Slight imp.
X	O (neg.)	+	Improvement
XI	O	—	No improvement
XII	O (neg.)	+	Improvement
XIII	O (neg.)	+	Improvement
XIV	+	—	No improvement
XV	+	—	Improvement
XVI	+	+	Improvement
XVII	O (neg.)	+	Improvement
XVIII	O	O	Slight imp.
XIX	O (neg.)	+	Improvement
XX	+	—	Improvement
XXI	+	—	Improvement
XXII	+	+	Improvement
XXIII	+	—	Improvement
XXIV	O	—	Improvement

NOTE: O = No change (Improvement).
+ = Change (Improvement).
— = No observation.

* Negative examinations before treatment. No. V thrown out through error in technic.

Six cases failed to show any biological or cytological improvement following treatment. It will be noted that cases II and VII had blood reactions only performed; and in both instances the primary results were negative. These might well be excluded from consideration. Of the remaining four which alone failed to show expected change, one presented only moderate improvement clinically, one slight change for the better and one no alteration in his condition. Hence in only one case which was clinically improved was there no change reported from laboratory examination. This patient (XXIV) showed no diminution in the intensity of his serum reaction. It was impossible to get consent for a second spinal puncture. In none did an improvement in reaction or cellular content of the spinal fluid occur without betterment of the clinical condition of the patient. In only one case (XIV) was there a change in serum reaction in a patient showing no physical improvement, hence, from this series, it appears that as an indication of clinical improvement the diminution in intensity of the serum reaction is of considerable value, but that that of the spinal fluid and especially that of lymphocytosis is in every instance a correct index.

DURATION OF IMPROVEMENT.

The accompanying table (No. VII) shows a detailed study of the improved cases of Class A in relation to the length of time that they have maintained their gains since receiving their last treatment.

TABLE VII.

TABES.

Months.	Cases.	
22	1	
20	2	
19	1	4 cases over 18 months
17	1	
13	1	2 cases from 12 to 18 months
11	2	
10	2	
9	1	5 cases from 9 to 12 months
4	2	
3	1	3 cases from 3 to 9 months
	14	

SYPHILIS OF THE CENTRAL NERVOUS SYSTEM.

Months.	Cases.
24	1
23	2
11	2
9	2
	7

The Table may convey an erroneous conclusion since in many instances patients have returned for further treatment without any relapse from their improved state. As a matter of fact, it is of great advantage for the patient to return at intervals even though in improved health to receive further treatment. If the somatic disease syphilis requires years of treatment for its eradication, it is rational to suppose that its elimination from such deep-seated structures as the cord, brain or meninges would require quite as long, if not a longer time.

All cases were received with care January 1, 1913. At that time one case was reported as improved (V), who now seems to show no change from his original condition. One case reported at that time as unimproved is now moderately benefited. These facts further emphasize the necessity of proper control through laboratory observations. In no other instance has there been a sufficient alteration in the patient's condition during the 11 months to warrant any change in classification.

TABLE VIII.

IMPROVEMENT IN TABES IN RELATION TO DURATION OF NERVOUS PROCESS.

Improved Cases.

Duration of Tabes.	Cases.
9 years	1
7 years	1
5 years	2
4 years	3
3 years	1
2 years	1
1 year	2
6 months	1
Total	12

Moderately Improved.

1 year	1 case

Slightly Improved.

1 year	1 case

Cases Showing no Improvement.

Duration of Tabes.	Cases.
9 years	1
5 years	2
Total	3

These figures show the unimproved cases to be of long duration. But on the other hand, many of the cases which showed the most striking benefit from salvarsan had been in progress five years or over. But one fact remains, that all the cases in this group, except those presenting paretic mental symptoms, which have shown slight or no improvement, have been those in whom advanced degenerative lesions existed before treatment. The cases of syphilis of the central nervous system, which have been benefited the most, have harbored the disease the longest. It is difficult to explain the reason for this peculiar fact.

A review of the tables fails to show any relation between the degree and speed of improvement and the date of initial syphilitic infection. Those who have harbored syphilis in the body for the longest periods seem to be as susceptible to improvement as those more freshly infected.

Persistence in treatment is essential for its success. Two injections are seldom of any lasting service. Although the greatest improvement is generally noted after the first or second administration, yet in the improved cases continuous progress is as a rule the result of repeated treatments. It seems wise to advise injections at one to two week intervals until six or eight are taken. Then it might be well to carry out series of two or three injections at six to eight week intervals, as Leredde advises.

Two of the unimproved cases were persistent in seeking relief, one receiving six and the other eight injections. Many showed improvement after only three or four doses, rarely one after only two. But the majority of those who adhered closely to the treatment have shown improvement. As is the case with syphilis elsewhere, treatment should not cease upon alleviation of symptoms. It has been impossible, however, to impress this fact forcibly enough upon the minds of most of this class. It is undoubtedly true that the results of this work would have been more satisfactory, had patients been willing to return for further treatment although for the present relieved.

TABLE XII. CLASS A.

CASE NUMBER	AGE.	DIAGNOSIS.	SYPHILITIC INFECTION.	DURATION OF SYMPTOMS.	CHIEF SIGNS AND SYMPTOMS.	WASSERMANN REACTION. BLOOD.	WASSERMANN REACTION. SPINAL FLUID.	CELL COUNT.
I	54	Ataxic Paraplegia Syphilitic	—	5 years	Spastic gait Urinary incontinence (6 months) Pain in legs (lancinating) Increased reflexes A.-R. pupil	9 viii 12 ++++	13 viii 12 ++++	13 viii 12 25
II	51	Tabes	+ 1887	4 years	Ataxia Lancinating pains Vertigo Bladder incontinence Difficulty in starting urine A.-R. pupil	16 xii 12 ++++	16 xii 12 ++++	16 xii 12 90
III	37	Tabes	+ ?	5 years	Blindness and diplopia Ataxia Paresthesia Lancinating pains Gastric crises Absent reflexes Hypotonia A.-R. pupil			
IV	46	Tabes	+ 1897	1 year	Ataxia Lancinating pains Paralysis of the larynx A.-R. pupil	24 viii 12 o	24 viii 12 o	24 viii 12 50
V	48	Tabes General paresis?	Denies	5 years	Ataxia Headache Mental changes Reflexes lost A.-R. pupil	28 ix 11 + ?	26 viii 11 ++++ ?	26 viii 11 "Normal"
VI	50	Tabes General paresis?	+ 1880	3-5 years	Ataxia Mental sypmtoms (viii 11) Lancinating pains Weakness	9 i 12 o	29 viii 11 ++ ?	29 viii 11 110
VII	37	Tabes	Denies	3-4 years	Ataxia Lancinating pains Gastric crises Lumbar pain	8 vii 12 o		
VIII	49	Tabes	—	9 years	Lancinating pains Gastric crises Urinary incontinence Poor eyesight A.-R. pupil	7 vii 12 ++++		
IX	37	Tabes	Denies	1 year	Lancinating pains Ataxia Urinary incontinence	19 xii 11 ++ 11 i 12 +		
X	37	Tabes	Denies	6 months	Slight ataxia Headache Gastric crises Lancinating pains Vertigo	25 i 12 o	25 i 12 o	25 i 12 310
XI	42	Tabes	+ 1887	5 years	Lancinating pains Ataxia Profound weakness Paresthesia (left side) A-R pupil	28 ix 11 ++ ?	?	22 viii 11 83
XII	49	Tabes	+ 1903	6-12 months	Ataxia Vertigo Girdle pain Lancinating pains	2 xi 11 o?	26 x 11 ++ ?	26 x 11 60
XIII	45	Tabes (Acute)	+ 1906	1 year	Ataxia Lancinating pains Gastric crises	10 i 13 o	10 i 13 o	10 i 13 120

CASES FOLLOWED TO DATE (DECEMBER, 1913).

TREATMENT.	WASSERMANN REACTION FOLLOWING TREATMENT. BLOOD.	SPINAL FLUID.	SUBSEQUENT CELL COUNT.	ILL EFFECTS OF TREATMENT.	RESULTS.
22 viii 12, 0.3 g. Salvarsan 12 ix 12, 0.3 g. Salvarsan		7 vii 13 o	7 vii 13 14 Proteid +	Forced to expose vein in both instances	26 xi 13, walks much better, uses no cane about house. Doing all her house work. No pain. No bladder incontinence. Has gained 28 pounds. Improved general condition. Reflexes and pupils unchanged. 4 xii 13, Luetin test negative.
	29 xi 13 +'+++		1 xii 13 3		
19 xii 12, 0.3 g. Salvarsan 9 i 13, 0.3 g. Sarvarsan 23 i 13, 0.3 g. Salvarsan 13 vi 13, 0.3 g. Salvarsan 26 vi 13, 0.3 g. Salvarsan 11 vii 13, 0.3 g. Salvarsan	13 vi 13 ++++ 26 xi 13 ++++	1 xii 13 ++	1 xii 13 36	None	26 xi 13, lancinating pains much less frequent, of shorter duration and less severe. Bladder incontinence less pronounced. No vertigo. Has gained 26 pounds. Improved general condition. Reflexes and pupils unchanged.
28 v 12, 0.3 g. Salvarsan 25 vi 12, 0.3 g. Salvarsan 9 vi 13, 0.3 g. Salvarsan 23 vi 13, 0.2 g. Salvarsan 17 vii 13, 0.3 g. Salvarsan 31 vii 13, 0.3 g. Salvarsan 14 viii 13, 0.3 g. Salvarsan 28 viii 13, 0.1 g. Salvarsan	9 vi 12 0 28 xi 13 o		22 i 13 60	Chill and general pains two days after first injection	28 v 13, pains and headache much relieved. General condition improved. 28 xi 13, formerly a cripple. Now gets about reasonably well without a cane. No lancinating pains. Good eyesight.
5 ix 12, 0.3 g. Salvarsan 3 x 12, 0.3 g. Salvarsan 22 i 13, 0.3 g. Salvarsan 23 i 13 serum into spinal canal	24 xi 13 ±		22 i 13 60	Marked reaction to spinal treatment	24 xi 13, diplopia and paralysis of larynx unchanged. Less pain. Gait better. Stronger generally. A.-R. pupil and reflexes unchanged.
28 ix 11, 0.3 g. Salvarsan 19 x 11, 0.3 g. Salvarsan 12 vi 12, 0.3 g. Salvarsan	9 xi 11 o? 12 iv 12 o 25 xi 13 o	8 ii 13 o 1 xii 13 o	None 8 ii 13 3 1 xii 13 10	None	25 xi 13 headache entirely relieved. No change in mental state. 4 xii 13, Luetin test negative.
9 i 12, 0.3 g. Salvarsan 15 ii 12, 0.3 g. Salvarsan 18 iv 12, 0.3 g. Salvarsan	25 xi 13 o	16 i 13 ++++ 13 xii 13 o?	None 16 i 13 110 25 xi 13 18	None	6 i 13, walking now without cane. Working short hours. 29 x 13, 60 to 70 per cent. better. 25 xi 13, complete recovery from pain. Working 7 to 8 hrs. daily. Marked general improvement. 4 xii 13, Luetin test negative.
17 x 12, 0.3 g. Salvarsan 21 xi 12, 0.3 g. Salvarsan 2 i 13, 0.3 g. Salvarsan	12 xii 12 o		None	None	3 xii 13, reported by letter. No pain. Gait fair. Improved general condition.
1 viii 12, 0.3 g. Salvarsan 29 viii 12, 0.3 g. Salvarsan 1 ix 12, 0.3 g. Salvarsan 7 xi 12, 0.3 g. Salvarsan 2 i 13, 0.3 g. Salvarsan	26 viii 13 + 24 xi 13 ++	5 ii 13 o 13 xii 13 o	5 ii 13 1 1 xii 13 o 13 xii 13 o	None	19 v 13 and 24 xi 13. No pain or urinary incontinence. No gastric crises. Eyesight better. Marked general improvement. For last 8 months has worked (dressmaking) 8 to 9 hrs. daily. Reflexes unchanged. 4 xii 13, Luetin test negative.
11 i 12, 0.3 g. Salvarsan 8 ii 12, 0.3 g. Salvarsan 7 iii 12, 0.3 g. Salvarsan	24 xi 13 ±			24 hrs. after second injection vomiting and severe lancinating pains	24 xi 13, pains not so severe or lasting. Rather stronger. Bladder symptoms unchanged. Reflexes unchanged.
25 i 12, 0.3 g. Salvarsan 29 ii 12, 0.3 g. Salvarsan 11 iv 12, 0.3 g. Salvarsan 2 v 12, 0.3 g. Salvarsan	28 xi 13 o	23 i 13 o	23 i 13 5	None	28 xi 13, no headache. Rare lancinating pain. No vertigo. General condition improved. Reflexes unchanged.
28 ix 11, 0.3 g. Salvarsan 9 x 11, 0.3 g. Salvarsan 4 i 12, 0.3 g. Salvarsan 8 ii 12, 0.3 g. Salvarsan 21 iii 12, 0.3 g. Salvarsan 18 vii 12, 0.3 g. Salvarsan	9 xi 11 ? 24 xi 13 + +			None	18 i 12, no change. 28 xii 12, no change. 24 xi 13 lancinating pains a little less severe, otherwise no change. General condition same or worse.
2 xi 11, 0.3 g. Salvarsan 15 xii 11, 0.3 g. Salvarsan 30 i 13, 0.3 g. Salvarsan 24 ii 13, 0.3 g. Salvarsan 26 vi 13, 0.3 g. Salvarsan 11 vii 13, 0.3 g. Salvarsan 22 vii 13, 0.3 g. Salvarsan 7 viii 13, 0.3 g. Salvarsan 21 viii 13, 0.3 g. Salvarsan 4 ix 13, 0.3 g. Salvarsan	14 vi 13 o 16 x 13 o 26 xi 13 o	21 i 13 ++++ 16 ix 13 o 1 xii 13 o	21 i 13 35 16 ix 13 29 1 xii 13 1	None	21 i 13, much less pain. Gait better. 28 v 13, general condition better. 1 xii 13, general condition much improved. Walking much better. No vertigo. Less girdle pain. No lancinating pain. 4 xii 13, Luetin test negative.
10 i 13, 0.3 g. Salvarsan 16 i 13, 0.3 g. Salvarsan 24 i 13, 0.3 g. Salvarsan 6 ii 13, 0.3 g. Salvarsan		11 ii 13 o	11 ii 13 15	None	28 v 13, pains and gait much better. General condition better. 1 xii 13, pains and gait continue improved. Gastric attacks persistent. (Reports by letter.)

TABLE XII. CLASS A.

CASE NUMBER	AGE.	DIAGNOSIS.	SYPHILITIC INFECTION.	DURATION OF SYMPTOMS.	CHIEF SIGNS AND SYMPTOMS.	WASSERMANN REACTION. BLOOD.	WASSERMANN REACTION. SPINAL FLUID.	CELL COUNT.
XIV	49	Tabes General Paresis?	+ 1885	9 years	Ataxia Irrational No mental control Lancinating pains A.-R. pupil	17 x 11 ++		
XV	32	Tabes	Denies	4 years	Ataxia Lancinating pains	1 viii 12 ++++		
XVI	35	Syphilis of central nervous system. (Basal)	+ 1911 Pharynx	1 year	Ataxia Diplopia Nausea Headache Vertigo	1 i 12 ±	1 i 12 o	1 i 12 30
XVII	50	Syphilis of central nervous system. (Thrombosis of post. inf. cerebellar artery)	+ 1881	2 years	Weakness Vertigo Hemianesthesia	2 xi 11 o	2 xi 11 ++++?	2 xi 11 40
XVIII	30	Syphilis of central nervous system. (Spinal)	+ 1908	1 year	Spastic paraplegia (legs) Urinary incontinence Deafness Increased reflexes	27 v 12 o	9 viii 12 o	9 viii 12 20
XIX	26	Spinal Syphilis. (Acute)	+ 1908	6 months	Ataxia Paralysis and pain in right leg Urinary incontinence	27 xi 12 o		27 xi 12 27
XX	27	Spinal syphilis	+ 1908	3 years	Pain in left arm	28 x 12 ++++	14 xi 12 ++	14 xi 12 110
XXI	43	Cerebral syphilis Optic atrophy Facial paralysis	Denies	4 years	Loss of sight (left) Failing vision (right) Facial paralysis (5 weeks)	26 vii 12 ++		
XXII	37	Tabes	?	3 years	Ataxia Lancinating pains Gastric crises	31 xi 11 ++++	16 xi 11 ++++?	16 xi 11 360
XXIII	52	Tabes	+ 1884	7 years	Lancinating pains Paresthesia Bladder incontinence	16 xi 11 ++++	16 xi 11 +	16 xi 11 7
XXIV	45	Tabes	+ 1891	2 years	Ptosis, right eye Failing eye sight Lancinating pains Abdominal pain Frequent micturition Gastric crises	26 x 11 +++++?	19 x 11 ++++?	19 x 11 50

CASES FOLLOWED TO DATE (DECEMBER, 1913).

TREATMENT.	WASSERMANN REACTION FOLLOWING TREATMENT. BLOOD.	SPINAL FLUID.	SUBSEQUENT CELL COUNT.	ILL EFFECTS OF TREATMENT.	RESULTS.
31 viii 11, 0.3 g. Salvarsan 18 ix 11, 0.3 g. Salvarsan 13 vi 13, 0.3 g. Salvarsan 26 vi 13, 0.3 g. Salvarsan 10 vii 13, 0.3 g. Salvarsan 24 vii 13, 0.3 g. Salvarsan 7 viii 13, 0.3 g. Salvarsan 21 viii 13, 0.3 g. Salarsan	10 vi 13 o 29 xi 13 ±			None	18 i 13 mental state unchanged. 29 xi 13, mental state same. Still has no control. Pains better. Little general improvement.
1 viii 12, 0.3 g. Salvarsan 21 xii 12, 0.3 g. Salvarsan 11 i 13, 0.3 g. Salvarsan 26 vi 13, 0.3 g. Salvarsan 24 vii 13, 0.3 g. Salvarsan 21 viii 13, 0.3 g. Salvarsan	10 vi 13 +			None	28 v 13, walking better. Moderate improvement in pain. General condition improved. 3 xii 13, reports by letter. No change from 28 v 13.
3 i 12, 0.3 g. Salvarsan 25 i 12, 0.3 g. Salvarsan	6 xii 13 o	23 i 13 o	23 i 13 6	Nausea all day after second injection	23 i 13, marked improvement in all symptoms. 4 vi 13, improvement continues. 6 xii 13, two months after last injection perfectly well. No return of old symptoms. Works five hours daily. No disturbance of cranial nerves.
2 xi 11, 0.3 g. Salvarsan 15 xii 11, 0.3 g. Salvarsan	12 xii 12 o 4 xii 13 o	16 i 13 o	16 i 13 3	None	16 i 13, much less vertigo and stiffness of legs. 4 xii 13, no vertigo Walking much better. Gait steady. More alert mentally. General condition improved. No disturbance of sensation.
29 viii 12, 0.3 g. Salvarsan 3 x 12, 03. g. Salvarsan 31 x 12, 0.3 g. Salvarsan 5 xii 12, 0.3 g. Salvarsan	4 xii 13 o	3 i 13 o 4 xii 13 o	3 i 13 7 4 xii 13 19	None	30 i 13, motor trouble continues. 4 xii 13, same trouble, but is a little stronger. General health now excellent. 4 xii 13, Luetin test negative.
5 xii 12, 0.3 g. Salvarsan 19 xii 12, 0.3 g. Salvarsan 10 i 13, 0.3 g. Salvarsan 23 i 13, 0.3 g. Salvarsan 30 i 13, 0.275 g. Salvarsan 13 iii 13, 0.3 g. Salvarsan	12 vi 13 o 28 xi 13 o	16 vi 13 ± 3 xii 13 o	16 iv 13 2 3 xii 13 4	None (Proteid slight)	30 i 13, legs stronger. More sensation. 10 iv 13, pains better. 28 xi 13, legs much stronger. Has worked the last four months. Urinary incontinence unchanged. Left leg, which was becoming involved, has remained strong.
14 xi 12, 0.3 g. Salvarsan 12 xii 12, 0.3 g. Salvarsan 1 i 13, 0.3 g. Salvarsan	28 xi 13 0			Increased pain in arm, nausea etc., following first injection; considerable after other two	12 xii 12, pains much better. 30 i 13, much better. 28 v 13, pain has returned (without treatment). 28 xi 13, somewhat better.
8 viii 12, 0.3 g. Salvarsan 5 ix 12, 0.3 g. Salvarsan 17 x 12, 0.3 g. Salvarsan 5 xii 12, 0.3 g. Salvarsan 26 xii 12, 0.3 g. Salvarsan 16 i 13, 0.3 g. Salvarsan 20 iii 13, 0.3 g. Salvarsan	23 ix 12 ± 8 xi 12 + + 3 iv 13 ± 26 xi 13 o	30 iv 13 o	30 iv 13 1	8 viii 12 extensive hematoma after injection, lasting 10 days	After first injection facial paralysis began to clear. 16 i 13, eye sight better. During xi 12 loss of orientation (3 wks.). 3 iv 13, mind clear. No vertigo. 26 xi 13, facial paralysis gone. Left eye, sight loss; right eye, sight good. (2 v 13, E. and E. Inf. report corr.) Has gained 23 pounds.
28 xii 11, 0.3 g. Salvarsan 25 i 12, 0.3 g. Salvarsan 13 v 12, 0.3 g. Salvarsan 19 xi 12, 0.3 g. Salvarsan	25 i 12 ± 13 v 12 o 19 xi 12 + 29 vi 13 o	7 x 13 o Proteid +	7 x 13 123	Vomiting and headache for 12 hrs. following one injection	27 v 13, lancinating pains rare. General condition much improved. 8 xii 13. Letter. Improvement has continued to date.
16 xi 11, 0.3 g. Salvarsan 21 xii 11, 0.3 g. Salvarsan 3 v 12, 0.3 g. Salvarsan	3 v 12 o			None	17 vi 13, bladder about the same. Marked improvement in pains and general condition. 12 xii 13. Letter. No pain. General health very good.
26 x 11, 0.3 g. Salvarsan 4 iv 12, 0.3 g. Salvarsan	23 i 13 + + + +			Venous thrombosis at end of administration. Considerable pain.	4 vi 13, pains; gait; sight and general condition improved. xii 13, no pains of any kind. General health improved. Letter.

CLASS B.

CASE NUMBER	AGE.	DIAGNOSIS.	SYPHILITIC INFECTION.	DURATION OF SYMPTOMS.	CHIEF SIGNS AND SYMPTOMS.	WASSERMANN REACTION. BLOOD.	SPINAL FLUID.	CELL COUNT.
XXV	32	Tabes	—	4 years	Ataxia Severe lancinating pains	14 v 12 o		
XXVI	33	Tabes	Denies	2-3 years	Ataxia Lancinating pains Paresthesia	28 xii 11 ±	24 i 12 +	24 i 12 50
XXVII	31	Tabes	—	2 years	Ataxia Lancinating pains and weakness of legs Gastric crises	2 xii 12 +		10 xii 12 410
XXVIII	51	Syphilis of central nervous system	+ 1882	6 months	Old hemiplegia Headache Vertigo	26 ii 12 o	26 ii 12 ++++	26 ii 12 33
XXIX	32	Syphilis of central nervous system	Denies	3 years	Spastic paraplegia Paresthesia of feet	19 xi 12 +	19 xi 12 ++	19 xi 12 170 Proteid ++
XXX	26	Cerebral tumor	Denies	10 months	Irritative phenomena of right side. Speech Headache Dimness of vision Old double iritis Right facial paralysis	19 v 11 +		

REACTIONS.

To the thirty members of Classes A and B, 134 intravenous injections of Salvarsan have been administered. Reactions, consisting of chills, nausea, vomiting and fever followed five injections. All reactions followed either the first or the second injection and lasted from 24 to 48 hours. In a few instances the reaction was delayed from 24 to 48 hours, as is not unusual in cases of this variety.

An extensive hematoma developed after one injection (XXI, which lasted for ten days. In two instances (XXIV and XXVII) a thrombosis followed one of the injections. Both attempts to introduce the needle directly in Case 1 failed and the vein was exposed. This is a fault to be avoided if possible, first because of the added complexity of the operation, secondly because the scar acts as tell-tale evidence, and, finally, because the vein exposed is necessarily unfit for subsequent use. This is a matter of considerable importance when frequent injections are contemplated. There were no other ill effects and no other difficulties in administration than those mentioned.

One man, who had been lost from observation, has been reported dead—cause unknown and not determinable.

HERXHEIMER REACTION.

The exaggeration of symptoms provoked by the administration of salvarsan is considered to be a modification of the so-called Herxheimer reaction. It is the opinion of Erlich and others that the parasiticidal action of the drug serves to liberate imprisoned spirillae or their toxines situated at the focus of infection. Whatever the cause, it is true that lancinating pains and gastric crises in tabes and headache in cerebral syphilis are very prone to be accentuated by the first treatments, when those symptoms are at all prominent. This reaction lasts for 24 to 48 hours or even as long as a week in some instances, but eventually passes away. Cases IX and XX suffered pronounced reaction of such a sort, the latter following all three injections, but being most pronounced after the first. The presence of such a modified Herxheimer reaction should be looked upon as a relatively hopeful sign, since in those cases the particular symptom which is so accentuated is often eventually relieved.

PROGNOSIS.

It is extremely difficult to foretell the result of this treatment. As has been shown, it is more than reasonable to hope for a consider-

CASES FOLLOWED TO JUNE, 1913. SUBSEQUENTLY UNTRACED.

TREATMENT.	WASSERMANN REACTION FOLLOWING TREATMENT. BLOOD.		ILL EFFECTS OF TREATMENT.	RESULTS.
14 v 12, 0.3 g. Salvarsan 13 vi 12, 0.3 g. Salvarsan 29 viii 12, 0.3 g. Salvarsan	4 vi 12 + 16 vii 12 o		None	19 ix 12, pain in left leg better. Has gained weight. Encouraged. 28 v 13. Last report, pains much better. Walks better. General condition improved.
14 ii 12, 0.3 g. Salvarsan 4 iv 12, 0.3 g. Salvarsan 2 iv 13, 0.3 g. Salvarsan 7 v 13, 0.3 g. Salvarsan			None	7 v 13. Last report, pains and general condition slightly improved.
10 xii 12, 0.3 g. Salvarsan 2 i 13, 0.3 g. Salvarsan 22 i 13, 0.3 g. Salvarsan 12 ii 13, 0.3 g. Salvarsan 8 iv 13, 0.3 g. Salvarsan 23 iv 13, 0.3 g. Salvarsan 7 v 13, 0.3 g. Salvarsan 22 v 13, 0.3 g. Salvarsan	12 ii 13 + 22 v 13 o		22 i 13, venous thrombosis following first injection	12 ii 13, scarcely any pain in legs. 22 v 13, pain distinctly better. Legs stronger. 6 vi 13, walking better.
29 ii 12, 0.3 g. Salvarsan 21 iii 12, 0.3 g. Salvarsan 25 vii 12, 0.3 g. Salvarsan 21 xii 12, 0.3 g. Salvarsan	25 vii 12 o 21 xii 12 o		None	21 iii 12, complete relief of headache. until three days before second injection. 25 vii 12, headache returned two days ago. 28 v 13. Last report, letter. Absolutely no headache or vertigo. Improved in every respect.
19 xi 12, 0.3 g. Salvarsan 21 xii 12, 0.3 g. Salvarsan 14 iv 13, 0.3 g. Salvarsan 8 v 13, 0.3 g. Salvarsan	8 v 13 o		None	21 xii 12, considerable improvement. 8 v 13, improvement continues. Better in every way.
18 i 12, 03 g. Salvarsan 21 ii 12, 0.3 g. Salvarsan 14 iii 12, 0.3 g. Salvarsan	23 i 13 Spinal Fluid 9 vi 13 Blood 0	Wass. 0 Cells 9	7 iii 12, nausea and vomiting following second injection. In bed a week. Arm stiff and lame	21 ii 12, arm became stronger after first injection. 14 iii 12, speech, gait and headache much improved. 28 v 13, headache, vertigo, gait and sight remain improved. General condition improved.

able degree of symptomatic relief. It is also evident that in many instances the course of the disease is for the time being, at least, checked. Many of the cases which showed negative fixation reactions in serum and spinal fluid prior to treatment have shown symptomatic relief. The cases as a rule in whom there was slight or no improvement, on the other hand, have shown primary reactions of only moderate intensity. The most striking fact is the marked improvement in cases, in whom biological and cytological examinations revealed intense syphilitic reactions. As might be expected, the results of anti-syphilitic treatment are more pronounced in those cases in whom the syphilitic element is most intense.

CONTRA-INDICATIONS.

Advanced cardiac disease, especially of myocardial origin, has been cited as a warning against salvarsan treatment. One case in Class A (V) falls into this category. He received three injections, however, without ill effect. That the heart became decompensated six months following his last injection shows the severity of the cardiac lesion and the apparent safety of salvarsan in this particular instance.

Two cases (Class C, 240 and 416) suggest a contra-indication which has received scant attention in the literature. Neither patient presented symptoms or signs of pulmonary tuberculosis prior to injection. Both developed active processes after their first and only treatment. In one, cough and fever appeared and tubercle bacilli were found in the sputum. The other had an haemoptysis. At the present time it is impossible to locate either patient. What may be a coincidence deserves consideration in the future.

CONCLUSIONS.

The following conclusions seem warranted:

(1.) The syphilitic character of the process was proved, with one exception, in all the cases upon which this work is based.

(2.) It is possible to treat in a satisfactory manner syphilitic diseases of the central nervous system by intravenous salvarsan in an ambulatory clinic.

(3.) Small doses of the drug are necessary for this purpose, but such dosage yields results.

(4.) With the exception of the six cases placed subsequently on serum treatment and excluded from this paper, symptomatic improvement has resulted from thorough treatment in a high percentage of cases of Tabes and in all cases of Syphilis of the Central

Nervous System. No distinct improvement has resulted from treatment of the few cases of General Paresis under observation.

(5.) Improvement in strength and gain in weight is the rule in those who receive benefit. The relief of lancinating pains in Tabes, and Headache in Cerebral Syphilis is most striking.

(6) Biological and Cytological Changes (in blood and spinal fluid) indicate that there is an organic basis to this symptomatic improvement. It is regrettable that those observations were of necessity so limited.

(7.) Improvement has been maintained over a long period of time—in many instances for from one to two years. The results of laboratory investigation when obtainable and the amelioration of symptoms correspond.

(8.) Whereas the failures have been in old-standing cases, it is impossible to show any constant relationship between the degree of improvement and the duration of the nervous lesion.

(9.) The most striking improvement follows the first or second injection. Treatment must, however, be persistent and prolonged and should be continued even if all symptoms and laboratory findings have long disappeared.

(10.) Reactions are infrequent with small doses of the drug. Accidents are rare.

(11.) Focal accentuations of symptoms (Herxheimer) disagreeable, but of short duration. These are often a hopeful sign.

(12.) The most pronounced successes are in those who show evidence in blood or spinal fluid of intense syphilitic infection. The failures have occurred in those showing feeble reactions.

(13.) Phthisis seems worthy of consideration as a contra-indication.

(14.) This treatment might well be advised in all cases of syphilitic disease of the central nervous system and abandoned for the serum treatment when conscientious effort in this simple and safe procedure has failed.

NOTE: Hearty thanks are extended to Dr. F. B. M. Cady for assistance in the administration of salvarsan and to Dr. A. R. Kilgore for the performance of the luetin test.

BIBLIOGRAPHY.

[1] Erb: 1881, Cont. f. die Med. Wissensch., No. 11, p. 195.
[2] Schaudinn and Hoffmann: 1905, Berlin. Klin. Wchr., vol. xlii, p. 673.
[3] Wassermann: 1906, Deutsche Med. Wchr., vol. xxxii, p. 745.
[4] Lercdde: 1913, Rev. gen. de Clin. et le Therap, vol. xxvii, p. 209.
[5] Ljass: 1913, Neurol. Cent., No. 4, p. 217.
[6] Collins and Armour: 1912, J. A. M. A., vol. lviii, p. 1918.
[7] Wechselmann: The Treatment of Syphilis by Salvarsan, Trans. Wolbarst, N. Y., 1911.
[8] Jadassohn: Correspond.-Blatt f. Schw. Aerzte, 1912, vol. xlii, p. 841.
[9] Swift and Ellis: 1913, Arch. of Inter. Med., vol. xii, p. 331.

SALVARSANIZED SERUM ("SWIFT-ELLIS TREATMENT") IN SYPHILITIC DISEASES OF THE CENTRAL NERVOUS SYSTEM.*

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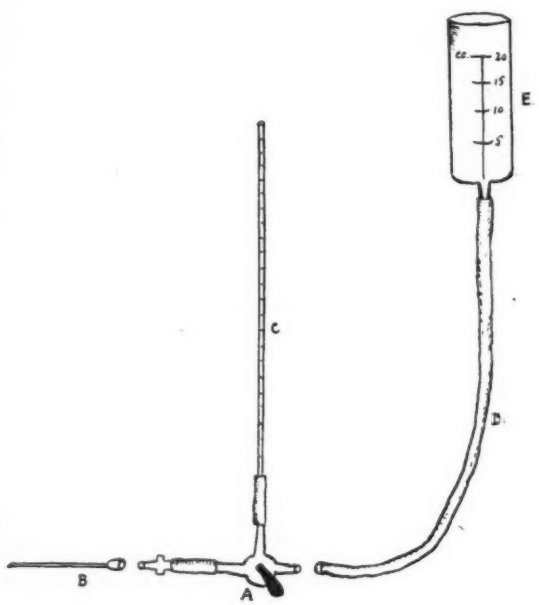
WHEN syphilis involves the cerebro-spinal axis physicians realize that a condition exists which is always resistant to treatment. To be sure symptomatic relief not infrequently occurs from a moderate amount of medication, but the conscientious physician understands that a cure has not been obtained; in fact the feeling has come to be a certainty that this form of syphilis, more than any other, does not die, but only sleeps, if indeed a repeatedly awakening process can be said to sleep.

Up to a few years ago the chief armamentarium of the neurologist in combatting these diseases was mercury and the iodides, and in the acute exacerbations of these conditions, whether the palsy of an active syphilitic condition or a sudden increase of pain in the tabetic, these remedies were used with greatest effect. The subject of general paresis, however, was looked upon as incurable from the



A. 3-way stop cock.
B. Lumbar puncture needle.
C. Glass tube; manometer graduated.
D. Rubber tubing connected with
E. Bowl of 20 cc. syringe.

* Read in substance before the Medical Section of the Suffolk District Medical Society, Dec. 17, 1913.

V.S. 54 yrs. TABES.

Symptoms. Pains in legs and feet. Incontinence of bladder. Gait unsteady.
Exam. Kn-jks and A-jks absent. Argyll-Rob. pupils. Romberg ++.
No previous treatment.

	SALVARSAN	SERUM	HG	KI		BLOOD WASSER'N	CEREBROSPINAL FLUID Wasser'n	Cells	Proteid	
1913 Jan. 30						+++	+++	130		
Feb. 5	.3gm.									
19	.3 "									
Mar. 5	.3 "									
19	.3 "									
Apr. 4	.3 "									
23	.3 "									
May 7	.3 "									
21	.3 "					+				
June 26	.3 "									
July 11	.3 "									
22	.3 "									Pain a little less.
Aug. 19	.3 "	30cc.					+++	23		
12	.3 "						-	3		
Sept. 27	.3 "									
24	.3 "	30 "					+++	26	+	
Oct. 9	.3 "	30 "					+++	21	+	
Nov. 30	.3 "	25 "					+	8	+	
20	.3 "	25 "					+	9	+	Has intervals of 4 days at times without pain. Gait better Bladder improved.
Dec. 4	.3 "	30 "					-	11		
31	.3 "	35 "				-		9		
1914 Jan. 22	.3	30 "			Gald +		+			
Feb. 5	.3	35 "			" +		+	9	+	Improvement continues.
Mar.										

R.J.O'N. 48 yrs. TABES. 2 yrs. Nº 2.

Lancinating pains 2 yrs Difficulty in walking 1 yr Denies syphilis
Exam: Romberg ++ K.j. absent. Pupils react to light.

	SALVARSAN	SERUM	HG	KI		BLOOD WASSER'N	CEREBROSPINAL FLUID Wasser'n	Cells	Proteid	
1912 Aug. 24						-	+	70		
Sept. 5	.3gm.									
Oct. 10	.3 "									
Nov. 7	.3 "									
Dec. 12	.3 "									Pains continue
1913 Jan. 1	.3 gm.									
16										
Feb. 17	.3 "	30cc.				-	+++	70		
								50		
Mar.										Severe gastric crises.
Apr. 25	.3 "	30 "								
May 7	.3 "	30 "					+++	8		
26	.3 "	35 "					+++	4		Pain now absent except for 24-48 hrs after medicine
June 9	.3 "	30						13		
July 23	.3 "	30 "					+++	5		
							+	1	+	
Aug. 30	.3 "	36 "					+++	0	+	
Sept. 12	.3 "	30 "					+	1	+	Better in every way
Oct.										
27										
Nov.	.3 "	30 "					+	1		+++ c new antigen.
Dec. 11	.3 "	35 "				-	+			Very little pain now
1914 Jan.										
Feb. 5	.3 "	35 "					+	5	+	More pain lately.

beginning, and an absolutely bad prognosis made in his case. With the advent of salvarsan a new hope appeared, and in many cases has been realized in the treatment of these affections, as Dr. Spooner's article clearly shows; but along with salvarsan therapy has come the frequent use of laboratory means of testing our patients until it has become only too clear to anybody working with these cases that there is a vast difference in relief of an individual symptom and a cure of the disease. Salvarsan given intravenously has done much good, it almost always does as much good as the older treatment, frequently does more, but in the light of modern methods of control, rarely can be said to cure.

It was with a view to reaching the cases refractory to other forms of treatment and if possible to cure syphilis of the central nervous system that Swift and Ellis commenced, two years ago, their method of subdural injection of salvarsanized serum [1], [2], [3]. Their method presupposes living spirochaetes as the infecting agent, harbored in the lymphatic system and interstitial substance of brain and cord, and supposedly cut off from the blood stream, and therefore not to be reached by drugs which cannot pass into the spinal fluid. It is not only a means of putting salvarsan into this isolated region, but salvarsan in its most effective form, namely, in combination with serum, for it has been clearly pointed out by Ehrlich[4] that salvarsan without the presence of serum is not anti-spirochaeticidal. As a matter of fact the quantity of salvarsan that reaches the spinal canal by this method must be so minute that it is logical to trace benefit from the treatment to the serum which has been acted upon by the salvarsan in vivo than to the drug itself.

The technique which the originators have recommended and to which we have adhered in all essentials is as follows:—one hour after an intravenous administration of salvarsan about 40 c. c. of blood are drawn under aseptic conditions and allowed to clot; the following day the serum is taken off and mixed with normal salt solution to make 30 c. c. of a 40% strength of serum, this heated at 56° C. for ½ hour and put into the spinal canal, replacing spinal fluid withdrawn.† It will readily be seen that in the carrying out of this technique frequent opportunity is given for laboratory control of the progress of treatment, so that in every case dealt with we have a double standard to guide us, the clinical symptoms and signs and the laboratory findings in blood and spinal fluid.‡ To bring about symptomatic improvement and even a seeming cure is frequently an easy matter, but to also reduce the spinal fluid to a normal appearance is always a more difficult task, yet necessary before we can claim a bona fide "cure."

The following 18 cases represent the experience of 13 months with serum therapy, although the cases for the most part have been observed for a much longer time. Generally the patients under discussion were placed upon serum treatment because refractory by one or both of the standards above considered, to other forms of therapy. Improvement in them should therefore be fairly attributed to salvarsanized serum; failure to improve, on the other hand, cannot be laid solely to this form of treatment, but must be shared with the others.

† See page 461 for Tests. ‡ See page 461 for Methods.

THE GROUP OF TABES.

PATIENT No. 1, V. S. is a tabetic with the usual symptoms and signs of this disease. He was benefited somewhat by intravenous salvarsan, but we thought to hasten this improvement by intraspinous injections, of which he has received nine with benefit as regards pain, bladder and general condition and to a less extent his walking. Symptomatic improvement has unquestionably proceeded more rapidly in the last 6 months under serum injections than in the previous 6 months under intravenous salvarsan alone.

The laboratory findings, however, have not varied greatly in the past three months, and we have been so far unable to reduce his spinal fluid to normal according to any test.

No. 2. R. J. O'N. had typical symptoms and signs of advancing tabes, pains and difficulty in walking, rendering him useless. He received five intravenous salvarsan injections without benefit either symptomatic or from a laboratory point of view. He was then given serum injections, eleven in number, throughout this year with marked benefit. His pain is now almost confined to a period 48 hours following injections and there is coincident improvement in his spinal fluid.

No. 3. A. F. Y. suffers principally from gastric crises, the intervening time between which was lessened by intravenous treatment from two week intervals to two month intervals. We are now seeking to still further better his condition by the use of serum, of which he has received five injections with no material change in condition.

CASE No. 4. J. J. C. is a motorman with symptoms and signs of tabes, the former extending over a period of 17 years. Salvarsan given by vein did not help him either from symptomatic or laboratory point of view; but a year's course of serum therapy, including 7 injections, has at last made him pain free, and tests normal, even using the strongest antigen on the spinal fluid. He will be carefully watched for evidence of relapse.

These four cases are of the hopeful type, showing primarily evidence of lower spinal cord involvement in an active stage as demonstrated by positive laboratory tests. The three treated for sufficient length of time to judge show improvement, and two of these have responded promptly and well to spinal injections after all other methods had failed.

L.W.B. GENERAL PARESIS? No 9

Chancre 1898 Feb'y 1912. Memory disturbances, hallucinations, delusions. Westboro'.
Feb'y 1913. Compl. of mouth, and inability to do his work satisfactorily.
Exam. negative, except for slight speech defect.

	SALVARSAN	SERUM	HG	KI		BLOOD WASSER'N	CEREBROSPINAL FLUID Wasser'n	Cells	Proteid	
1912 Feb. 1913 Jan.	.6 gm (Dec)					++	++	+		
Feb. 8						+++	+++	44		Came under care of writer.
14	.3 -									
Mar. 15	.3 -									
29	.3 -									
Apr. 12	.3 -									
21								44		
May 2	.3 -	.25 c.c.					+++	71		
23										
8	.3	35 -					+++	6		
June 22	.3 -	35 -					+++	22		
11	.3 -	32 -					+++	9	+	
July 25	.3 -									Passed C.S. exam. "Physically sound".
Aug. 4	.3 -	34 -					-	2		Wife says he is much better than for long time.
Sept. 30				↓						
Oct.										
Nov.										
Dec. 9										Lost his job, because "too slow".
26	.3 -	30 -				+	+++	42		

J. J. C. 48 yrs. TABES. (17 yrs.) No 4.

1st Visit. 1908. Compl. pains in legs and arms, incontinence bladder and unsteadiness.
Exam. A.j. and k.j. absent. Romberg and ataxia + Pupils react.
1912. Symptoms and signs unchanged. Denies syphilis

	SALVARSAN	SERUM	HG	KI		BLOOD WASSER'N	CEREBROSPINAL FLUID Wasser'n	Cells	Proteid	
1912 Apr.	+ } DD.									
May	+ }									
June 14	.3 gm.					+				Symptoms same.
July 18	.3 -									Pain less for short time after injection.
Aug. 7							+	60		
Sept.			↓							
Oct.										
Nov. 5	+ } DD.									
Dec. 5	+ }									
1913 Jan. 21							+++	55		Much pain for 6 weeks. Discouraged.
23	.3 gm.	30 c.c.								
Feb. 10	.3 -	30 -				-		54		
Mar. 18	.3 -	30 -					+++			
23										
Apr.	.3 -	30 -				+!	-	15		
May 18	.3 -	30 -				-	+++	13		No pain for 1 month.
June										
July										
Aug. 27	.3 -	35 -					-	1		
Sept.										
Oct.										
Nov. 19	.3 -	30 -					-*	2		Has not lost a days work since August. Gain in weight.
Dec.										
										*New antigen.

The next two belong to a group which has been designated "atrophic," with evidence of little or no activity from the laboratory point of view (perhaps because of insufficient delicacy of these tests), though still having severe pain. Both cases are of some 20 years standing.

CASE No. 5. Mr. S. received only two injections and claimed his pains were worse, too small a number to judge of the value of the treatment.

CASE No. 6. S. has thus far received three injections and while the pain continues with nearly the same frequency—namely, one attack a day—it is less severe when present. His bladder has recovered considerable tone. He has also gained 10 pounds in the last month and is in every respect more comfortable.

Two cases of tabes presenting progressive primary optic atrophy were treated as follows:

No. 7's eyes were rapidly undergoing atrophy, in spite of intravenous salvarsan. We hoped with serum treatment to stop the process, but only succeeded in slowing it a little, the patient having gone on to almost complete blindness. On the other hand he has showed marked improvement in general condition, so much so that he wished to continue treatment for this effect. With him we see little change in the serologic tests.

No. 8. G. A. P.'s optic atrophy was more slowly progressive. In spite of two courses of intravenous salvarsan (in all 9 doses of .3 gram each), and much mercury over a period of eleven months, vision progressively failed, with serum during the past four months—7 doses in all—the atrophy does not seem to be advancing, and laboratory tests have improved greatly.

SUMMARY.

Eight cases of tabes were dealt with, falling naturally into 3 classes: Nos. 1, 2, 3, 4 giving evidence of lower spinal cord disease in an active stage, 5 and 6 active as regards symptoms, but quite inactive to our laboratory tests; the third class, Nos. 7 and 8 "superior tabes" in which primary optic atrophy was the reason for undergoing treatment.

IN CLASS 1, lower cord tabes active both clinically and to tests, 3 cases, treated for a long period of time have received marked symptomatic relief, pains, bladders, general strength and weight all improved. Signs have not been seen to change. From the laboratory point of view marked benefit, in one case going to a negative Wassermann in the fluid tested with the re-enforced antigen. The fourth case of this class has shown no change in any respect as yet on five injections.

CLASS 2 contains two cases of long-standing tabes of some 20 years duration. No marked change was anticipated in them because of the inactive condition of the fluid, so that when one patient (6) increased in weight 10 pounds in 30 days and declared his pain was benefited we were agreeably surprised.

CLASS 3, the optic atrophy cases, have been the most resistant to treatment. Of the two in our series one (7) has continued his course to blindness with hardly any moderation in rapidity, and no change in laboratory tests. The second (8) with much more slowly progressing atrophy is holding his own as far as sight is concerned, with improvement in laboratory tests. It has been said that optic atrophy is contraindication to the use of salvarsan, but we have used it now in 18 cases, without any increase in rapidity of the process, and with, I believe, benefit in several. The majority, however seem not to be affected one way or the other.

Four cases may be grouped under *general paresis*, but in two the diagnosis may well be questioned. As others, [5], [6] had spent much time on advanced cases, with not too satisfactory results, we determined to try only early ones, so early in fact that in two we hardly feel justified in making an absolute diagnosis.

No. 9. L. W. B. 14 years after his primary infection, showed evidence of mental disturbance, with hallucinations of sight and delusions (though not of grandeur) so that confinement was necessary, but with negative physical signs. He had positive laboratory tests throughout. He has responded somewhat to treatment, his wife noting much improvement in his actions. His tests improved while under treatment, but relapse, in the laboratory sense, promptly followed cessation of injections, as will be seen in his chart.

No. 10. Mrs. L. T. has had typical epileptiform seizures, and has besides Argyll-Robertson pupils, but when taken in hand had no mental stigmata of dementia paralytica. She however continued to have her epileptiform attacks and later developed hallucinations and delusions, and commitment became necessary. It is interesting to note that in her case the reaction to the medicine was not one of pain, but either no reaction at all, or occasionally a production of hallucination of sight and hearing.

No. 11. H. C. D. was unequivocally diagnosticated general paresis by the neurologist referring him for treatment on the basis of epileptiform seizures, dizzy attacks and mild mental disturbance coming on 8 years following a chancre. Physical examination has always been negative, but laboratory tests all positive except that the blood is positive only to the stronger antigen. He is undeniably much better for treatment, as evidenced by his appearance, his capacity for work, his actions and his entire freedom from epileptiform attacks since starting treatment. From a laboratory standpoint also he has shown steady benefit from the injections. Like case 9 symptomatic relapse was accompanied by "laboratory relapse" when treatment was discontinued for six months.

No. 12. A. M. S. is a girl of 7 years, syphilitic from her first year and exhibiting for over a year epileptic attacks, mental restlessness and gen-

eral mental backwardness. She has inactive pupils, as her sole physical sign of syphilis of the nervous system. In two respects she has benefited by treatments;—she now has no epileptic seizures and she is neater and cleaner in her habits; even the neighbors, harsh critics of children, admit this. The treatment of this case was necessarily carried out in a different manner from the others. Inasmuch as she had very small veins we were forced to use a foreign serum. The first six injections were with blood obtained from her father in the usual manner, he, however giving a negative Wassermann test and unquestionably not suffering from active syphilis in any form. The last four injections were with serum obtained from tabetics under treatment on the same day.

SUMMARY.

The influence of salvarsanized serum has been distinctly less beneficial in this group than in either the foregoing or subsequent group. All have shown amelioration of laboratory findings, and supposedly therefore diminution of activity of the syphilitic process. This laboratory improvement has however come with greater difficulty than in any other group; nor has it been so constantly parallel with symptomatic improvement. One undoubted case of general paresis has proceeded to a worse condition without material modification in the course of the disease (10); but in two epileptic attacks have ceased, though in one of these petit mal seizures seem to have replaced the more severe ones.

No. 13. Miss N. R. may best be classified in a group which is gaining in recognition, perhaps best called *"latent nerve syphilis."* She shows no true stigmata of general paresis, yet her symptoms are referable more to brain than cord; a typical Argyll-Robertson pupil and occurrence of symptoms probably seven years after infection clearly take her out of the class of so-called cerebro-spinal syphilis. We feel that she is a candidate for general paresis, but cannot certainly place her in that category. She has as yet had only 4 serum injections but symptomatic and laboratory improvement is already observable. It is in this group of cases, difficult of diagnosis frequently, in which we may expect much from intensive treatment.

The last group, admittedly the easiest of all to help, even with older forms of treatment, is that of *cerebro-spinal syphilis*, with a latent period of months or only a few years at most. In all of these we see marked benefit and in them we may, if in any, hope for a cure.

No. 14. A. C. had an unconscious attack about a year following his primary lesion. He was later found to have choking of both optic nerves and positive laboratory tests. Intravenous salvarsan helped him, but we thought to clinch its beneficial results with serum treatment, and so far we have met with success. He was discharged in October clinically well, and tests almost perfect. Three months later he reported on request, still without symptoms and his spinal fluid still further improved; the Wassermann reaction and cell count became normal first, later the proteid tests all became negative (Noguchi, Nonne and alcohol), but we find the Lange gold test alone evidence of his syphilitic infection.

No. 15. V. Z. denies syphilitic infection, but presented himself with a history of failing sight for eight months past, and headache. He showed double optic neuritis, concentrically contracted fields and complete internal ophthalmoplegia. Intravenous salvarsan relieved symptoms and the optic neuritis, but ophthalmoplegia and tests remained positive. Serum administration has greatly improved the fluid findings; and on my last examination on Dec. 1st. the accommodation reflex in the left eye was found to have returned.

No. 16. W. E. N. is a case of cerebral "neuro-relapse." In spite of (or "because of" as some say) five salvarsan injections, mercury and iodide, he developed a cerebral syphilitic process; for three weeks he had a temperature and pulse record closely simulating typhoid. He was benefited by more salvarsan and two serum injections, but on June 20th. while away from the hospital on leave of absence he had a shock leaving him paralyzed on the left side. At this point I was asked to see him, recommending, much to the disgust, I fear, of one physician, more serum injections, arguing that he had done well on those which he had received, but that he needed more of them. He has, as his chart shows, done well. his complaints are none, except that he cannot find work to do, and the condition of his fluid is greatly improved. In spite of freedom from symptoms he is of course not cured.

It is interesting that here laboratory evidence of syphilis has disappeared more quickly in spinal fluid than in blood, unlike the case with long-standing involvement of the cerebro-spinal axis.

No. 17. W. B. B. is another case of "neuro-relapse," this time the cord being the objective point. His walking, progressively more spastic when serum treatment was begun is now nearly natural, and a bilateral ankle clonus which was present has disappeared, although Babinski's sign still remains on both sides. His tests also coincide with his clinical improvement.

No. 18. J. D., the last of these cases is a particularly interesting patient. Since his first injection of salvarsan by vein, after which his only symptom, headache, disappeared, he has belonged to the class of "latent nerve syphilis." He might have been discharged after one injection to testify to the great efficiency of the one-dose treatment. But unfortunately for his peace of mind we were enabled to show that he had much trouble still present and repeated treatments hardly benefited the tests. After five intravenous injections, it was determined to try the effect of serum treatment on his tests (for all this time he had no symptoms or signs of disease other than the laboratory findings.) A prompt response was the result and five injections improved the fluid to a considerable extent, when the patient was forced to leave town for the summer. During the three

W. E. N. 20 yrs. CEREBRAL SYPHILIS (Neuro-relapse) № 16.

Chancre, Dec. 1912. Onset of cerebral syphilis in March in spite of adequate treatment.

	SALVARSAN	SERUM	HG	KI		BLOOD WASSER'N	CEREBROSPINAL FLUID Wasser'n	Cells	Proteid	
Dec. 1913 Jan.	5 treat-									Chancre. Secondary symptoms.
Feb.	ments in									
Mar.	O. P. D.									Headache
Apr. 25						−	+++	320		"Typhoidal temp".
May 13	Two treatments							150		
23	House						+++	144		
June 27								160		
4							+	68		June 20. Left hemiparesis
23	.3 gm.	30 cc.					+	68	+	
July 8	.3 "	30 "					−	60	+	
Aug. 30	.3 "	24 "					−	3	−	Paresis gone, exc. slt facial.
16 Sept.							−	4	+	Headache again.
Oct. 6	.3 "	30 "				+++	+	3		
28 Nov. 6	.3 " .3 "									
20 Dec.	.3 "									
4	.3 "	30 cc.					+	1		Feels quite well.
Jan 20	.3 "	30 "				+*	−*			

A. C. 25 yrs. CEREBRAL SYPHILIS. № 14.

Syphilis 1911. July 1912, unconscious attack lasting 6 hrs, no paralysis

Dec. 30/12 Complaint: Transitory weakness arms + legs Transitory diplopia. Vision.

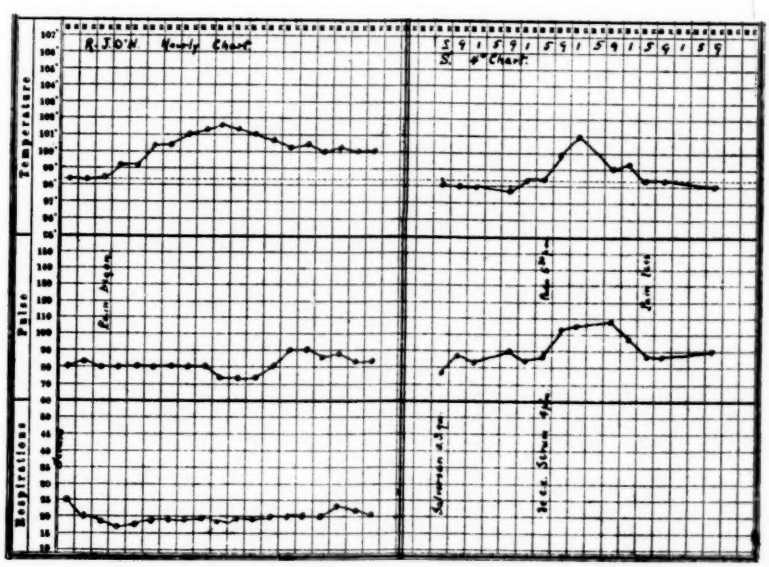
Exam. Choked discs, both eyes. Reflexes + pupils normal

	SALVARSAN	SERUM	HG	KI		BLOOD WASSER'N	CEREBROSPINAL FLUID Wasser'n	Cells	Proteid	
1912 Aug.	+ (Dr. V.N.)									
Sept.										
Oct.										
Nov.										
Dec.										under charge of writer.
30								+		
1913 Jan. 10	.3 gm.					+	anti-g	110		
22	.3 "									
Feb. 5	.3 "									Better. Eye movements perfect. No choking.
Mar. 20							−	20		
Apr. 26	.3 "	30/20 cc.					+++	140		Jaundice?
May										
June										
July 11	.3 "	30 "					+	23		
Aug. 31	.3 "	30 "					−	8		Vision normal. Fundi nor'l
Sept. 27	3 "	30 "					−	4	+	
Oct. 9	3 "	30 "					−	5	+	Feels quite well.
Nov.										
Dec.										
24 Jan. 13	3 "	30 "			Gold +		−*	0	−	Vision almost perfect. Neurolog. Exam. negative.

J. D. 23 yrs. SYPHILIS C.N.S. № 18

Syphilis 3 years ago; inadequate treatment.
For 5 weeks constant headache, no other symptoms.
Exam. negative.

	SALVARSAN	SERUM	HG	KI		BLOOD WASSER'N	CEREBROSPINAL FLUID Wasser'n	Cells	Proteid	
1912 Sept. 11	.3 gm.			↓		−				
21 Oct. 23						−	+++	578		
Nov. 7	.3 "									Well. Headache gone.
Dec. 19	.3 "									
1913 Jan. 10	.3 gm.									
23 Feb. 17	.3 "						+++	340		
Mar. 6	.3 "	30 cc								
27 Apr. 16	.3 "	30 "					+	82		
23 May 7	.3 "	35 "					+	51		
22 June 9	.3 "	30 "					+?	36		
July	.3 "	30 "	↓				−	19		Feels perfectly well.
Aug.							+	40		
Sept.										
Oct. 1										
6 Nov. 27	.3 "	30 "				−	+++	475		No symptoms.
18 Dec. 2	.3 "	30 "					+++	66		
Jan. 8	.3 "	25 "						50	+	
Feb. 22	.3 "	30 "			Gold+	−*	+++*	45	+	
							+++*	15		



TYPES OF REACTION.

months following he was perfectly well, but on October 1st. to our astonishment the fluid had returned to nearly its original state. Again the condition and possibilities of future trouble were explained to him and again he has submitted himself to our attempts to eradicate a condition which bothers him not at all, but which, we feel, is a constant source of danger to him. This case more clearly than any other shows the efficiency of salvarsanized serum in attacking the pathological process, where salvarsan alone had failed; again laboratory relapse when treatment was discontinued is followed by improvement again with treatment resumed.

SUMMARY.

Summary of these five cases of active cerebrospinal syphilis shows improvement according to all the standards we have set up, symptoms, signs and laboratory tests. The critic, however, will rightly suggest that this group usually does very nicely with other treatment. He will also admit that some do not, and, as a matter of fact 4 of these 5 cases were chosen for serum therapy because resistant to other forms of treatment. Thus No. 15 showed symptomatic improvement from salvarsan administered by vein, but the use of serum treatment was promptly followed also by laboratory changes for the better. Again two cases of "neuro-relapse" occurred while the patients were under intravenous salvarsan, mercurial or iodide therapy; and serum treatment alone seemed efficient to stop the process. Patient No. 18 showed no laboratory improvement from intravenous salvarsan and KI, but when placed upon serum treatment improvement commenced; in spite of mercury (which was poorly tolerated) this improvement could not be maintained, a "laboratory relapse" setting in, which seems, however, to be again controlled by salvarsanized serum.

DISCUSSION.

The cases under discussion form a small number from which to generalize, as to the efficiency of a given treatment; still, more can be argued from these than from a hap-hazard group of 18 cases in that they are for the most part selected cases; they were largely chosen because of unsatisfactory results from other forms of therapy. Of these 18 cases then, representing a variety of types of syphilis of the nervous system, more or less refractory to other treatment, we find 14 distinctly improved, one unchanged, and three continuing on their course essentially unchanged. Of the four not benefited, two fall into the category of general paresis, two of tabes. Of the latter one showed a rapidly advancing optic atrophy, taken when sight was already far gone, the other was a long-standing case of the "atrophic type."

Of those benefited, the improvement for the most part has been striking, but seldom rapid. Improvement has for the most part been slow, but steady; those who have been persistent in treatment are those who have almost always obtained the most benefit; it has been striking and often gratifying to see patients return again and again for injections, without any urging; even those who underwent the most severe reactions were unremitting in their attendance, and this alone testifies to the good they felt they derived.

The above charts represent 219 venous injections of salvarsan or neo-salvarsan, and 126 serum injections. Of all these we have seen no harmful effects, other than the "reaction," below considered. True, we have persistently used small doses, .3 gm. of salvarsan and 30 c. c. of a 40-60% strength serum; we should have preferred to use larger doses, but as the patients were necessarily mostly ambulatory as far as the venous injections were concerned we could hardly do otherwise.

The reactions obtained are interesting. Tabetics almost always have severe pain, sometimes confined to the legs, frequently over the entire body. Two tabetics in particular would commence their reactions at a set time, one 3 hours the other 1½ hours after the serum injection, and with each pain the muscle bundle in the region affected would quiver as if stimulated by an electrode, first in one part, then another. These reactions last from 24 to 36 hours, and frequently are accompanied by rise of temperature, and less frequently of pulse also, there being no increase of the blood leucocytes (see charts.) Reactions in the other cases, one of superior tabes, the other a paretic, were quite different; these did not complain of pain, but on several occasions became hallucinated. One said "I see the trees looking short and the room all out of proportion. I hear voices speaking to me and yet I know it is not right." Again this same patient had bad dreams the night after an injection. Some patients on the other hand had no reaction at all. One, No. 18, a chauffeur, would take his car out three hours after an injection time and again, and never would feel any effects from the treatment. Naturally, some hesitation was felt concerning the use of foreign serum in the case of patient No. 12, but the only ill effects noted from this procedure was an urticarial eruption on one occasion similar to that obtained from the use of antitoxin.

Our *conclusions* then from the use of salvarsanized serum, a procedure so ably elaborated by Swift and Ellis, are these:

The method is safe.

It is effective in many cases where other treatment has failed.

It undoubtedly attacks syphilis from the etiological point of view, thus tending to cure the disease as well as relieve symptoms.

Its greatest effect is in the group of cerebrospinal syphilis, in which a cure may confidently be looked for in some cases with persistent treat-

ment; second, in tabes, in which arrest of disease process is often possible by this means; least effective in general paresis, when well developed, though here if taken in the pre-paretic stage encouraging results may be obtained.

With the originators of the method, we agree that persistence in its use is the key-note to success in the use of salvarsanized serum; consequently an estimate from the injection of one or two doses is a judgment more of the "reaction" which in some cases is severe, than of the therapeutic effect of the serum.

With the technique of administration and necessary control examinations as laborious as at present, we do not expect to see this form of treatment in general use, but believe it should be employed by those especially trained when other treatment fails in whole or in part, or in cases where haste is required in order to save vital tissue.

I wish to express my thanks to Dr. E. W. Taylor, chief of the neurological clinic at the Massachusetts General Hospital, through whose cooperation this work was possible; also to Drs. H. C. Baldwin, W. E. Paul and G. A. Waterman for encouragement and cases both in hospital and private; also to Drs. Swift and Ellis of the Rockefeller Institute for going over technic and protocols with me.

BIBLIOGRAPHY.

[1] Swift, H. F. and Ellis, A. M.: A Study of the Spirochaeticidal Action of the Serum of Patients Treated with Salvarsan, J. Exp. Med., Oct., 1913, vol. xviii, 4, p. 435.

[2] Swift, H. F., and Ellis, A. M.: The effect of Intraspinous Injection of Salvarsan and Neosalvarsan in Monkeys, *Idem.* p. 428.

[3] Swift, H. F., and Ellis, A. M.: The Treatment of Syphilitic Affections of the Central Nervous System with Especial Reference to the Use of Intraspinous Injections, Arch. Int. Med., Sept., 1913, vol. 12, p. 331.

[4] Ehrlich, P.: Chemiotherapy, British Med. Jour., Aug. 16, 1913, No. 2746.

[5] Myerson, A.: Progress with the Treatment of Paresis by Salvarsanized Serum, BOSTON MED. AND SURG. JOUR., Sept. 18, 1913.

[6] Robertson, G. M.: General Paralysis of the Insane, Jour. Mental Sci., vol. lix, April, 1913.

Also the following:

[7] Hough, W. H.: Intraspinous Injection of Salvarnized Serum in the Treatment of Syphilis of the Nervous System, Including Tabes and Paresis, Jour. Am. Med. Asso., Jan. 17, 1914, vol. lxii, p. 183.

[8] McCaskey, G. W.: The Autoserosalvarsan Treatment of Syphilis of the Central Nervous System, *Idem.* p. 187.

[9] Ferrier in an address before the International Congress, London, 1913, speaks of this method as a great advance in the treatment of these disorders.

† LABORATORY TESTS.—The following technic in carrying out laboratory tests was employed in the spinal fluid: Cell count by means of the Zeiss cell counting chamber, using Zappert-Ewing ruling. A stain (methyl violet 0.1, acetic acid 2.0, water 50.0), drawn to mark 1 of the "white counter," and spinal fluid to 11, *immediately* after withdrawal of fluid from body; 1 cmm. counted on two slides and correction made for dilution. An accurate differential count is not possible by this means, but a rough index of the kind of cells present is possible, and these are almost invariably mostly lymphocytes. Proteid tests: (1) ethyl alcohol precipitation gives a rough index of the amount of coagulable proteid present, though normally there is some clouding. (2) Noguchi globulin reaction; 0.2 cc. of fluid + 0.5 cc. of a 10% butyric acid solution in normal saline boiled, and 0.1 cc. of a normal NaOH solution added and again boiled; a precipitate indicates a pathological condition of the spinal fluid. (3) Nonne's Phase I reaction; equal parts of fluid and saturated solution of ammonium sulphate to form a ring of precipitated proteid at their junction in a pathological condition. These tests have not all been performed on a given fluid; in fact it is only recently that I have begun to use the last-named as a routine procedure. Wassermann reaction performed at the Havard Medical School under direction of Dr. W. A. Hinton, and the Massachusetts General Hospital, under direction of Dr. Homer Wright until three months ago using the following antigens: (1) heart, (2) syphilitic liver of foetus; more recently a heart antigen reënforced with cholesterin; 0.5 cc. fluid used in each instance. Blood. Wassermann as above, using 0.2 cc. serum.

‡ METHODS OF ADMINISTRATION OF SALVARSAN AND SERUM.—First, salvarsan, rarely neosalvarsan, given in the usual manner intravenously. It is quite necessary that the salvarsan be given without cutting to expose the vein, inasmuch as many injections are required. Second, blood withdrawn either by means of a syringe and transferred to a sterile test tube or drawn directly into the tube by means of a suction apparatus. Third, serum pipetted off next day, mixed with saline to 40%, 50% or 60% strength as the case allowed and heated in water bath at 56° C. for one-half hour.

Fourth, lumbar puncture under cocaine anesthesia with the apparatus shown in cut. By means of a 3-way stop-cock the normal pressure is obtained, fluid is then allowed to escape by turning cock until the pressure has been reduced to about 40 mm. or until 20 cc. have been obtained, the serum is then allowed to flow in by gravity from a height not exceeding the pressure of the fluid as originally determined. By simply turning the stop-cock and thus connecting manometer with spinal canal the pressure may at any time during the flow be measured, and the rapidity of flow be controlled so that the pressure may be very gradually re-established. It is usually found that 30 cc. of serum may be injected to replace about 15 cc. of fluid withdrawn if plenty of time, 5 to 10 minutes, is taken at this step, which will leave the pressure the same as at the beginning. If done properly this whole procedure is of no inconvenience at all to the patient after the first puncture of the cocaine needle. The after-effects are either (1) reaction to the medicine, or (2) some headache and nausea, which not infrequently follow any lumbar puncture, no matter how carefully carried out.

EPICONDYLITIS (FRANKE) OR TENNIS-ELBOW.

BY WILLIAM PEARCE COUES, M. D., BOSTON.

This interesting affection first described by Bähr[1] in 1900 and later by Clado[2] and Franke[3], though known by some physicians, has not been described or studied in America to any great extent. Many diagnoses have been made of the condition such as "bursitis of the elbow," "neuritis," sprain, and functional disability from over-use. The injury leading to the disability is not uncommon in those who take much physical exercise, particularly lawn-tennis, whence the name: "tennis elbow." As will be shown later, however, athletic sports in which strenuous and exact movements of the arm play an important part, are not the only causes of the trouble. The history of the affection in those in whom it occurs in the course of their favorite exercise is almost invariably as follows: Immediately after a stroke, or occasionally some few hours or days afterwards, pain is noted in the elbow, usually the right, in the neighborhood of the external condyle. This pain may be so severe and sudden as to seem to paralyze the arm temporarily, so that all movements are performed with the greatest difficulty or not at all. This pain is usually markedly increased by extension of the forearm, not so much by flexion and may be intermittent or constant, and returns immediately the exercise is taken up again. Lesser degrees of pain and disability are noted in many cases. The pain is most sharply limited to the neighborhood of the external epicondyle of the humerus.

Examination soon after the injury usually shows no marked swelling of the elbow and no ecchymosis. The motion of the elbow is not as a rule limited in flexion or extension; but there may be great pain on forced extension in the neighborhood of the external condyle. The radial head is found to rotate perfectly. Pronation and supination are usually performed without pain. In short, the examination would seem to certainly rule without any marked bony lesion

or fracture. On pressure, an exquisitely painful spot the size of a dime, is found directly over the external epicondyle. Much pain is felt in this spot on full extension of the forearm, which radiates down the arm to the fingers. The pain is increased when the fingers are closed over a round hard object, as a crystal globe. It is also brought on or increased by such motions as reaching a book from a library shelf and particularly in putting on a coat. After such movements, the arm may feel weak and useless for a considerable time. Sometimes, there may be a suggestion of slight thickening felt over the external epicondyle; but this is never marked. Crepitus or abnormal mobility of the epicondyle is never noted.

After a period of weeks or months, with or without treatment, the pain and the tender spot gradually disappear. The patient may again take up the favorite sport, with, however, a possibility of a speedy recurrence of the trouble. A considerable disability and discomfort may result from the injury,—much more than that only necessitating giving up the chosen exercise. Exactly the same trouble occurs from hard manual labor, as will be seen later.

From such a definite localization of the pain and tenderness with other suggestive symptoms of this injury, we may justly presuppose some characteristic and constant lesion of the tissues immediately adjoining the external condyle of the humerus. Tears of the fascia or some muscular bundle have been suspected in a general way, as well as nerve implication. Whatever the lesion is, it seems generally limited to that part of the external epicondyle affording attachment to the supinator brevis, extensor communis, extensor minimi digiti and anconeus muscles. Besides this particular region the humero-radial part of the joint capsule to which some of these muscles are attached has been suspected. Regarding the mechanism of the injury, it seems probable that it occurs during partial extension of the whole arm, the elbow slightly flexed at a time when the forearm is midway between pronation and supination, and that some of the muscles exerting a powerful pull, tear off their attachments to the external epicondyle, perhaps tearing off small pieces of bone with them. In cases where the exercise is repeatedly attempted after the initial injury, this process may be repeated in a lesser degree again and again; thus giving rise perhaps in some cases to a localized periostitis of the external epicondyle. This also may be kept up by the ordinary movements of the arm in daily life. It is established that simple rest of the elbow for a short time does not cure the condition. It may become quiescent and the patient might think it entirely cured, when the first stroke of his racket will bring back all the pain and disability. That numerous theories of the etiology of this condition have been put forth other than the above will be seen later. Certainly some of them do not seem to be compatible with the findings of the typical cases. Some authors even assert that the condition is noted without any traumatism at all and is the result of a bacterial infection at some time. It may be said that a careful examination of the cases seen gave no sign of a neuritis. The lesion is too sharply localized to be due to any involvement of the elbow joint as a whole. Exquisite tenderness on palpation of the epicondyle over a spot the size of a dime is pathognomonic of the trouble.

Brief anatomical considerations are now in order before taking up the various authors' views.

The external epicondyle, the radio-humeral part of the joint capsule and the supinator brevis muscle are the structures suspected of involvement by those who have made a study of this condition. According to Sobatta[4], "the centres of the epicondyle appear between ten and twelve years. But complete ossification of all parts of the bone and disappearance between synchrondroses between epiphyses and diaphyses do not occur until between the twentieth and twenty-second year. From the external epicondyle arise the superficial extensor muscles of the forearm. The external lateral ligament of the elbow, otherwise known as the radial, arises from the external epicondyle, and passes as to fassiculi to the annular ligament, with which a portion of its fibres are continuous. The humero-radial joint does not act as an independent joint. From a practical standpoint the elbow may be regarded as a hinged joint whose axis of movement passes through the two epicondyles. The humero-radial joint does not take part in this movement as the ends of the bones are hardly in contact in flexion. The humero-radial articulation is only passively involved in the pivot movement of the proximo radio ulna joint, since the radius rotates in the socket about its long axis, and the actual pivot movement takes place in the proximo and distal radio ulna articulation." According to McAllster[5], "the outer epicondyle is short and convex behind and its extremity inclines forward. Its upper part affords attachment to the extensor carpi radialis brevior. Below this from above downwards and backwards come the extensor digitorum communis, extensor minimi digiti, extensor carpi ulnaris, anconeus, and close to the supinator brevis the capsular ligament. The origin of the extensors of the hand area extends behind the capitellum as far as the outer lip of the trochlear." The supinator brevis, the muscle supposed to be most concerned in epicondylitis, or tennis-elbow, is a deep and short muscle under the above-named extensors. "It arises from the back of part of the epicondyle, external lateral ligament, orbicular ligament of radius and from a rough ridge on the ulna below the lesser sigmoid cavity. It is inserted in the outer third of the radius." If this muscle is injured in the movements of the arm which cause tennis-elbow, it is difficult to see how injury of the external lateral and orbicular liga-

ments and joint capsule can be avoided, they are so intimately connected. The orbicular ligament, moreover, is said to limit to some extent pronation and supination so that its injury in tennis-elbow would seem very probable.

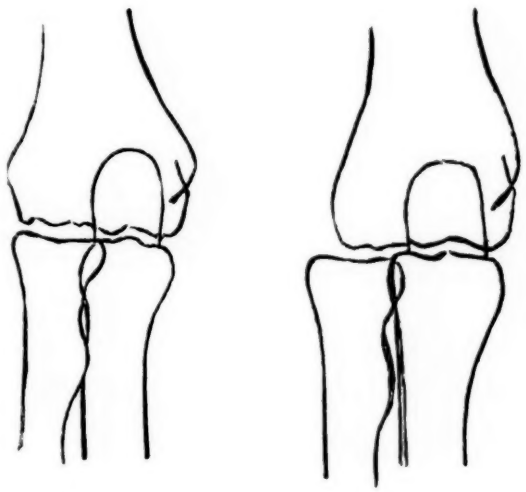
Franke[3] named the affection epicondylitis. He speaks of its being due to injury in sports, particularly tennis, and also of its arising without trauma. He did not observe it in children but in men and women of the leisure class. He speaks of the classic pain with localized tenderness and believes that at times the process is due to a localizing of the inflammation due to the influenza bacillus. He cites his own case in this regard. He never saw it in those having gonorrhea, syphilis, diabetes, nephritis or tuberculosis. He is inclined to believe that a nerve disturbance of some sort and rheumatism may cause the trouble at times. He never noted pain in the radius or ulna in these cases. In two of them there were swelling of the skin over the epicondyle. Other pains and aches in the neighborhood of joints and bones were noted by him in some of his cases, especially the internal condyle of the femur, the tarsal and metatarsal bones.

Anti-rheumatics and Preissnitz compresses were used. Fixation of the elbow gave the best results. He chiseled off the epicondyle in some cases, but does not state the result of this procedure.

Bernhardt[6] considers that over-extension of the muscles attached to the external condyle is the cause of the trouble. He states that it has been named: "Epikondylagie" by Féré.

Momburg[7] reviews Franke's article and cites briefly 14 cases of what he terms periostitis from "epicondylitis humeri." Almost all his cases were in the laboring class and the injuries were contracted during manual labor in a number of cases. Lifting a heavy weight was given for the causes of some. The complaint in all his cases was the same:—pain in the elbow in the region of the external condyle so severe that work had to be stopped. This pain often extended from the epicondyle to the forearm and fingers; also at times to the upper arm and shoulder. (He is the only author who speaks of this.) Pronation, supination, flexion and extension of the hand and fingers, (not of the forearm,) was particularly painful. Objectively pain on pressure over the epicondyle was the symptom. No changes were noted in the skin over the epicondyle. Sometimes what seemed to be slight doughy swelling of the periosteum was detected. However, the Roentgen pictures show no bony changes. He can not agree with Franke that a nerve or rheumatic trouble is the cause of the pain and tenderness about the epicondyle. He believes it is a periostitis of the epicondyle, and that it is caused by muscular pull, and likens it to the periostitis of the tibia of soldiers, from constant marching. The trouble was seldom noted by him in the internal condyle, and he gives the reason as due to the different muscular attachments.

Preiser[8] refers to Franke's, Momburg's, Clado's and Bernhardt's articles and says he has seen the trouble many times. He thinks it gives a typical Roentgen picture and that this means a static trouble with the head of the radius. He shows by a diagram that in his cases the radial head is outside of a line drawn down as a continuation of the external epicondyle.



Elbow.
After Preiser.

The radial "inkongruenz" of Preiser.
Sketch A. Normal.
Sketch B. The radial head is outside of a line drawn down as a continuation of the epicondyle. This Preiser believes obtains in cases of "Tennis Elbow."

He thinks that the condition is predisposing to and often really signifies arthritis deformans cubiti. He believes that only in an elbow already deformed in the periostitic shadow visible. He does not consider the name "epicondylitis" or "periostitis" as appropriate; and instead proposes the term: "static deformity." His explanation of the trouble is as follows: that the supinator longus and supinator brevis muscles, at least the fibres of each that reach the anterior joint capsule, are antagonistic at the moment of simultaneous contraction of both muscles. Said simultaneous contraction of both muscles occurs only in one movement, when the hand is snapped strongly and quickly from volar flexion into strong adduction.

He finds, moreover, that the radio-humeral joint capsule is always very tender to pressure. No sign of periostitis is shown in these cases. He does not think influenza infection has caused the trouble. He says he had two cases in tennis-players. The onset of the pain in both cases was sudden. The pain was localized in the external condyle region and there was slight swelling. Perfect extension was possible in these cases, ruling out bony blocking of the joint by any gross fragment. The Roentgen picture showed normal bones in both cases. There was a collection of fluid at the side of the capsule

and he believed the lesion to be a humero-radial joint capsule tear, with chronic capsular inflammation. He cites the case of a smith who had exactly the same lesion as the two tennis players. This man was obliged to strike an iron kettle in a certain way while soldering it. He was obliged to have his hand round his body midway between pronation and supination with the elbow flexed and the whole arm adducted. Preiser does not think that rupture of the supinator brevis muscle can account for the lesion. He advocates massage, friction and hot-water bandages every other day.

Clado, writing in 1902, says that no one had studied this affection previously, but he could not have seen Bähr's article. It is, according to him, a well marked pathologic entity involving muscular rupture. He was able, owing to the courtesy of 12 of the best tennis-players of France, to study the subject thoroughly. He agrees with those authors quoted who wrote after him, that sudden pain in the external part of the elbow leading to inability to use the arm for certain movements is the classic symptom. Violent muscular contraction seems to him responsible for the trouble. Rarely, the trouble may come on without sudden pain, after hard play, he states. Good or expert players are the only ones affected. He did not observe it in women players. The symptoms are (1) pain, (2) "impotence functionel," (3) swelling, (not always noted.) The arm may fall as if paralyzed and the player can not continue playing. Other cases less severe were noted by him as well as by others, but the pain came on again at the first attempt to play. This pain was localized to the external epicondyle in the region of the supinator brevis. There was exquisite pain on pressure of the examining finger. There was no constant swelling in his case, and the skin was always intact. Passive movements of the forearm were not painful. Causing the supinator brevis to act immediately produced great pain. The movements of the elbow joint in flexion and extension were perfect; and gave no pain. Clado does not think that the external lateral ligament and synovial membrane can enter into the trouble from the nature of the symptoms; but the rupture and tears of the supinator brevis muscle account for all the symptoms. He admits that there is not enough swelling for total rupture of the muscle to have occurred. He never found a hernia of the muscle and ecchymosis was noted only once. To give a stroke which causes tennis-elbow, Clado says, the arm is transformed into a rigid lever, nearly horizontal, the elbow slightly flexed, the forearm and hand being midway between pronation and supination, the radial border directed upward, the racket prolonging this lever. He thinks the slight flexion of the elbow is maintained in this position by balance between the flexors and extensors; and the short supinator enters alone into action against the strong pronators and alone maintains the arm in equilibrium against its antagonizing muscles. He says that, in America, the expert players have a different style of game and that the muscles of the abdominal wall are torn and that one does not see tennis-arm in America. This, we know, is not so, if tennis-elbow and tennis-arm are used synonymously.

CONSIDERATION OF PERSONAL CASES.

I have had opportunity to study three cases of tennis-elbow, all in athletic men. None of them ever had had any previous trouble with his elbow.

CASE 1. On Oct. 16, 1913, while riding in an automobile, the right elbow was struck by a jolting of the car, but did not give any trouble until a week later, when, after playing lawn tennis, it felt somewhat stiff. On the following day, after half an hour's hard play, a sharp pain was felt in the outer side of the elbow and forearm on making back hand strokes, which require a fixed position of the arm half way between pronation and supination, and almost complete inability to make such strokes. At the same time, forehand strokes, requiring simple flexion only, were made with very little discomfort. On examination, an exquisitely painful point was found on the epicondyle. Otherwise the joint seemed normal.

Heat and rest seemed to make little change in the condition. The arm felt weak at times, especially after grasping any object firmly and lifting it or in putting on a coat. Disability has continued for three months and at present the patient is still unable to use the arm for exercise. Examination shows no atrophy; the radius rotates perfectly; no thickening is detected over the epicondyle. There is still marked pain on pressure over the epicondyle; the x-ray shows no gross bony abnormality. There is a question of a very slight thickening of the periosteum over the epicondyle. The radiograph, though fairly good, was not perfect enough to make this diagnosis positively.

CASE 2. Vigorous athletic man, seven years ago, after constantly playing tennis, noted gradually increasing pain in the right epicondyle. There was local tenderness in the spot complained of by all these patients. There was six month's disability. Examination seven years after this time, still showed tenderness over the epicondyle but no other abnormality. This patient was much inconvenienced by the trouble and played at squash rackets with his left hand at this time for six months. The x-ray in this case showed two little spicules of bone torn off presumably from the inner posterior surface of the condyle or epicondyle. An x-ray of the left arm, which had been used constantly at the time of disability, showed also a small spicule of bone apparently torn off from the internal condyle.

CASE 3. Athletic man, played squash rackets, tennis and golf. While playing golf, July, 1913, the patient noticed immediate pain in the right elbow just after a stroke. Patient was left-handed. The pain was not severe enough to make the patient drop his club, but there was a distinct sensation of something tearing in the neighborhood of the external epicondyle of the right arm. The injury was not severe enough to cause the patient to stop play that summer. An exquisitely painful spot

appeared over the external epicondyle. Flexion and extension of the fingers caused marked pain in this spot. There was considerable pain and disability for six months and the arm is not well at the present time of writing, January, 1914. There is aching at times over the region of the external condyle; considerable discomfort when carrying a bag or putting on a coat is experienced. Flexion and extension of the forearm is performed fully; but forced extension causes considerable pain in the region of the external epicondyle. An x-ray of this case showed what seemed to be a small spicule of bone in the neighborhood of the joint surface between the ulna and the humerus.

TREATMENT.

Patients with this trouble are naturally most interested in what steps can be taken to cut short their disability, and it must be admitted that treatment of the condition is very unsatisfactory. Most authors who have written on this subject agree that heat and fixation seem to be the best methods with massage as a supplementary measure. It is an affection which seems to be particularly stubborn and often takes its own time to get well in spite of any treatment; six months of disability or at least of foregoing the chosen exercise must be looked for in most cases.

CONCLUSIONS.

It would seem from a study of the trouble based on those cases in the literature and of the personal ones that there might be perfectly well two lesions causing the symptom complex known as tennis-elbow or epicondylitis.

First, a partial tearing of some of the muscular attachments from the external epicondyle, giving rise to the separation of the bony spicules as in Cases 2 and 3, with the possibility of a periostitis from such tearing, which need not necessarily be marked enough to show in a radiograph.

Second: Injury to the radio-humeral joint capsule from antagonistic muscular contraction of the supinator brevis and supinator longus, as believed by Preiser. It does not seem as if Preiser's theory of predisposition to arthritis deformans of the radial head could be accepted in all cases.

I thank Dr. W. E. Faulkner and Dr. John W. Cummin for valuable suggestions in the preparation of this paper.

REFERENCES.

[1] Bihr: Tennisschmerzen, Deutsch. Med. Wochenschrift, 1900, no. 44, p. 713.
[2] Clado: Tennis-arm, Progrès Médical, 1902, no. 44, p. 273.
[3] Franke: Ueber Epicondylitis Humeri, Deutsch. Med. Wochenschrift, vol. 36, no. 1, p. 13. Deutsch. Med. Wochenschrift, 1910, no. 9, p. 430. No. 21, p. 999, 1910, vol. 36.
[4] Sobatta: Anatomy, p. 122, vol. i, ed. 1906.
[5] McAllister: Human Anatomy, 1889, p. 144.
[6] Bernhardt, M.: Bemerkungen zu dem Aufsatz f. Frankes, "Ueber Epicondylitis Humeri," Deutsch. Med. Wochenschrift, vol. 36, p. 221.
[7] Momburg: Ueber Periostitis am Epicondylitis Humeri, Deutsch. Med. Wochenschrift, vol. 36, no. 6, p. 260.
[8] Preiser, Georg: Zentralblatt für Chirurg., no. 3, 1907, p. 65. Zeitschr. für. Orthoped. Chirurg., 25 Bande, S. 415. "Arthritis Deformans Cubitn," Deutsch. Med. Wochenschrft, vol. 36, p. 221.

Reports of Societies.

SUFFOLK DISTRICT MEDICAL SOCIETY IN CONJUNCTION WITH THE BOSTON MEDICAL LIBRARY.

MEETING OF THE MEDICAL SECTION, DECEMBER 17, 1913.

LESLEY H. SPOONER, M.D., Secretary.

Dr. Lesley H. Spooner and Dr. James B. Ayer read papers on,

RECENT ADVANCES IN THE TREATMENT OF SYPHILITIC DISEASE OF THE NERVOUS SYSTEM.*

DISCUSSION.

DR. G. O. SANBORN: As discussion of these excellent papers, my own experience in the use of Swift's intradural method may be of interest. At the Boston City Hospital and in private practice, I have given 92 intradural injections of salvarsanized serum to 31 cases of syphilis of the central nervous system during the last eleven months.

The final test of efficiency of antisyphilitic treatment is the permanent disappearance of a positive Wassermann reaction. In syphilis of the central nervous system, pleocytosin, and globulin, both of them signs of syphilitic irritation, also must give way to normal conditions. It has been shown tonight that repeated doses of salvarsan intravenously produce improvement in these objective signs of syphilis of the nervous system. Nevertheless, this method, alone, has seemed to be inadequate and the reason appears to be that the blood borne salvarsan does not reach the spinal fluid or the chronic, walled off lesions in relation to it, in sufficient concentration to be spirochaeticidal. Swift's method is calculated to supply this need, in that salvarsan charged serum is injected within the dura and thus directly fortifies the spinal fluid. He showed that the serum injected is spirochaeticidal; that immediate improvement in pathologic conditions of the spinal fluid is due to the serum injected and not in great measure due to the salvarsan given intravenously; that clinical improvement accompanies serologic changes; that improvement may be lasting. The conception and development of this method is a notable scientific achievement.

I have studied the effect of this method in producing changes in the pathologic conditions of the spinal fluid in tabes, paresis, and in some other types of chronic nerve syphilis. The clinical course of these cases has been followed closely by Dr. Coriat. I will mention only these cases in which the diagnosis is clear clinically, and whose spinal fluids gave consistent abnormal findings, pleocytosis, positive globulin and positive Wassermann tests.

The technic is essentially that demonstrated to me by Dr. Swift at the Rockefeller Hospital, in November, 1912. In these cases, maximum doses of neo-salvarsan have been used. In one case having

* See pp. 441 and 452.

had 8 doses, the interval between was 8 to 10 days; in others the interval has been two or three weeks to three months. All have received treatment in a hospital, and have remained in bed at least 24 hours. There have been no deaths and no serious results of any kind. The reaction during the 24 hours after injection, in the tabetics, has consisted of pain, sometimes severe. Slight temperature also has occurred in a few cases.

The tabetics have received from 2 to 6 injections of serum. In none of these has a positive Wassermann become negative (1 c.c. of spinal fluid used). Positive globulin has become negative in two cases. The cell count has been affected strikingly by treatment. The average cell count in 11 cases before treatment, was 56. In the same cases, two weeks to two months later, with no intervening treatment, the cell count was 18, a diminution of 70% from one combined treatment. Ten of these cases, after 3 to 5 serum injections, each, gave a final average cell count of 9. The average of the total drop in cell count was 84%. Clinical improvement has been noted in all cases, as follows: general condition; gain of weight; all but two, less ataxic; pains ceased save in three cases, and in the latter are no longer severe; three had lost control of bladder sphincter, and have regained it. In three undoubted cases of paresis, cell counts of 100, 60 and 40, respectively, have dropped to normal, after 4 to 6 intradural injections. There has been definite and maintained clinical improvement in all. It is my intention to continue treatment of this group of cases until normal spinal fluids have been attained, or until I am convinced that this is impossible.

DR. A. MYERSON: My experience with Swift-Ellis treatment has been mostly limited to its use in general paresis. I have had two cases of cerebral spinal syphilis, both of which did very well treated by salvarsanized serum. I have treated eight cases of paresis for periods varying from three to seven months. Injections were given every two weeks in the majority of cases and the procedure was essentially as that advised by Swift-Ellis. As the results have been tabulated elsewhere (BOSTON MEDICAL AND SURGICAL JOURNAL), I shall not trouble you with a detailed report. Suffice to say that the most striking change was in the biological reactions. In the majority of cases, the Wassermann reaction was for at least a short time, negative in blood or spinal fluid, or both. The cellular count diminished and the globulin reaction became less intense. In none of the cases was this a permanent result, although in some, the biological improvement lasted for months. One case died, one other became markedly worse, these changes being in no wise related to the treatment since the patients were not selected from any stage of the disease. Clinically, change for better was not so obvious as serologically. One man had a complete remission, but as he was on the road to this before treatment commenced, credit cannot be taken by the treatment for this. Three of the patients remained stationary, two of the cases made some clinical improvement.

As for the rationâle of the treatment, I believe that the change is based on a fallacy which does not affect its use and value in cerebral syphilis and tabes, but which in a case of paresis is fatal to the success of the treatment. The treatment presupposes a local effect of the salvarsanized serum, but I wish to point out that the cerebral spinal fluid does not reach the lesions of paresis except those in the meninges. The cerebral spinal fluid is not a route on the way *towards* the nervous system, it is a route on the way *from* the nervous system. It is not an *afferent* current, it is an *efferent* current. That is to say, no matter where it is manufactured, whether in the choroid plexus or by the blood vessels, whether it is transudate, exudate, dialyzed fluid or true secretion it does not enter into intimate relations with the nerve cells, nor does any fluid injected into it reach the nerve cell or touch the paper tissues of the nervous system. The lesion of general paresis is essentially arterial, chronic inflammatory and degenerate, and the bulk of the change takes place away from the influence of the cerebral spinal fluid; moreover, the spirochaetes have not been found superficially, but deep in the tissues of the brain, so that there seems to be no rational basis for the belief that the Swift-Ellis treatment, which has for its new feature the use of salvarsanized serum, will cure paresis.

Moreover paresis is a disease essentially characterized by remission. This is true of the biology of syphilis in general, and the state hospitals can present numerous cases where individuals have enjoyed such remissions from the effects of paresis as to enable them to go home, in some cases for long periods of time; further, no one knows the biological variations in paresis because no one has performed repeated lumbar punctures and serological examinations up to the time this treatment may be necessary.

In two of my cases, the Wassermann was negative the first examination, but positive at a later one without treatment and without any change in the clinical symptoms, and the reverse has been true in one case.

Reliance upon the cell counts as a quantitative measure is based, it seems to me, upon the belief that the counting chamber method can be accurate. I do not believe that such is the case. I believe the range of error to be as much as ten or fifteen cells per cubic millimeter in any case where there is a distinct cell increase. The most that one can really say in any case is that there is a small cell increase, a large cell increase, or very large increase, and approximate the figures rather than give them with a pretence of exactness.

Dr. Ayer has well called our attention to the fact that there is a preparetic stage, in which treatment is hopeful. With this I cordially agree and, moreover, I believe that this is a recognizable stage. In the period before the outbreak of paresis, there are symptoms. In this connection I want to call your attention to a paper by Dr. Wm. W. Graves of St. Louis which appeared on August, 1912, in the *New York Medical Report*. The title of this paper was "Syphilitic Syndrome," and Graves here points out that the chronic or latent syphilitic has physical signs of a nature to have a diagnosis made. These are pigmentation, pallor, small changes in the pupils, small changes in the reflexes, such as the dropping out of one or the other of the skin reflexes, exaggeration, inequality and arterio changes. To this I wish to add that on the laboratory side we can obtain evidence. First, the Wassermann reaction of the blood on repeated examination; second, the chemical changes in the spinal fluid, and especially of the increase in albumen, which I believe occurs before globulin reaction or the increased cell count of the Wassermann reaction. Taken at this stage, I feel we could cope, perhaps successfully.

with the disease, and perhaps by the Swift-Ellis method; but at the present time, and in the average paretic, treatment by this method influences the course of disease but does not stay it.

DR. ISADOR H. CORIAT: Dr. Sanborn and I have been closely associated in this combined neurological and serological work, and we have treated in all about 30 cases by the intraspinous method. The types of syphilitic diseases of the central nervous system which have come under treatment have been combined system disease of the spinal cord, specific meningo myelitis, cerebral syphilis, cerebrospinal syphilis, dementia paralytica, tabes and juvenile paresis. No bad results have followed the treatment. In nearly all cases there was serological improvement even if the cases showed no changes clinically. The clinical improvement could be grouped under two headings, viz:—improvement in the subjective complaints and improvements in the objective signs of the disease. As would naturally be the case, the subjective improvement was always more marked than the objective, although the latter was noted to a certain extent in a few cases. Varying according to the diagnosis, the subjective improvement was as follows: In tabes, a lessening of the lightening pains and of the gastric crises and an improvement in general strength; in cerebral syphilis, a diminution of the headache and even in some cases a complete freedom from headache; in spinal syphilis, increased strength in the legs and in paresis, some improvement in the mental condition. Of course in this latter disease, the question of fluctuation in the disease process and of remissions must be considered. Objective improvement has likewise been noted in a few cases, but in these cases only certain isolated objective signs have improved. In specific meningo myelitis, the gait has improved; in tabes, improvement of the urinary incontinence, of gait and ataxia, and improvement in certain reflexes, such as the light reaction of the pupils. In one case the knee jerks became brisk, whereas formerly they were only obtained on reinforcement. The significance of these changes in the reflexes, it is impossible to determine at present. The clinical improvement usually ran parallel with the serological improvement, although we have noted serological relapses without clinical relapses, and vice versa. The problem of treatment of syphilis of the nervous system is the problem of accessibility of the spirochetae. In specific endarteritis, of course, beneficial results are to be expected from intravenous injections of salvarsan. But in the meningeal forms, in paresis, tabes and system diseases where the causative agent lies at a distance from the blood vessels in the perivascular and perineuronal spaces, the best results are to be obtained by the intraspinous method of treatment, thus bringing both the drug and the syphilitic anti-bodies into direct communication with spirochetae. Since the cerebrospinal fluid does not come from the blood current, but is a true secretion from the choroid plexus and the direction of flow is from the fluid to the blood, it follows that the best treatment for syphilis of the nervous system is by introduction of the causative agent directly into the cerbrospinal fluid.

DR. J. C. WALKER: I am in sympathy with the remarks made by Dr. Coriat in regard to the cell count in the spinal fluid, and I do not agree with what I understood Doctor Myerson to state, namely, that the cell count in the spinal fluid varies from day to day, and is not to be depended on as an index of active disease of the meninges. At the Peter Bent Brigham Hospital we perform lumbar puncture on every case of syphilis and in forty or fifty cases in various stages, excepting cases of central nervous system syphilis, the highest spinal fluid cell count has been four, usually two and often none or one.

In regard to the Wassermann reaction, I believe that when done by an intelligent person who understands the reaction, and when conscientiously and carefully controlled, it is more than a symptom, and it is indispensable in the diagnosis of syphilis.

It is too late in the evening to enumerate the cases of syphilis which we have treated intraspinally, but our results agree with those of Doctors Ayer, Sanborn, and others, and I feel that this new method introduced by Swift and Ellis, is of great value as a treatment, especially in cerebro-spinal syphilis and of help in tabes. I would like to mention one case of cerebral syphilis with primary optic atrophy, which was given four intraspinal treatments alone without intravenous salvarsan treatments. This salvarsanized serum introduced into the spinal canal had no injurious effects upon the optic nerve, in fact before treatment there was a steady gradual decline in his sight. Since the treatment, although the patient thinks it has improved his sight very slightly, his sight surely has gotten no worse, and the decrease of the spinal cell count from forty-three to seven indicates improvement. A second case of tabes got no improvement from six salvarsan treatments alone, but four intravenous salvarsan and intraspinal treatments relieved his incontinence of urine, and whereas previously the patient had to get up four or five times at night to urinate, now he has to get up only once. In this case the pains in the lower extremities have disappeared, the gait has improved so much that the patient walks much daily for exercise, and the cell count has dropped from forty-four to two.

Book Reviews.

The Midwife in England. Being a Study of the Working of the English Midwives Act of 1902. By CAROLINE CONANT VAN BLARCOM, executive secretary. New York: Committee for the Prevention of Blindness (No. 13). December, 1913.

This very readable pamphlet begins with an enthusiastic introduction by Prof. Edgar, who endorses all that the author has written. The aim of the writer is evidently to convince the general public of the necessity of the trained, licensed, and regulated midwife in America, basing her arguments on the success of the operation of the English Midwives Act of 1902. She was in England only six weeks observing midwives in the making at their recitations, lectures, and examinations; she followed the midwife on her rounds in practice, and she followed the inspectors in their work of checking up. She gives an accurate account of the history of the midwife in England down to the passage of the Midwives' Bill of 1902, and also a minute description of this bill and its operative machinery. The work concludes with four exhaustive appendices, making it a valuable book of reference.

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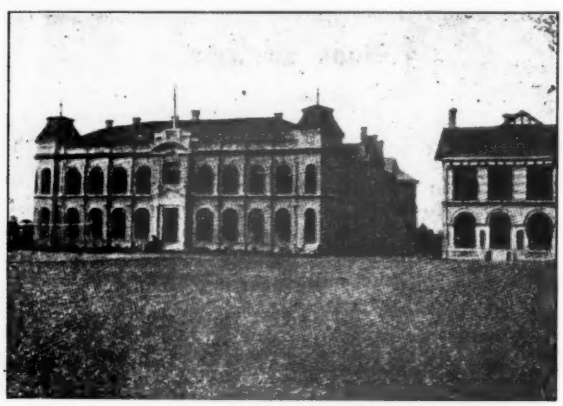
THE HARVARD MEDICAL SCHOOL OF CHINA.

A CIRCULAR letter of information and appeal (reprinted in another column of this issue of the JOURNAL) has recently been sent by Dr. Martin R. Edwards to all graduates of the Harvard Medical School relative to the present status and needs of the Harvard Medical School of China. This school was founded at Shanghai in 1909 and inaugurated two years later.



THE HARVARD MEDICAL SCHOOL OF CHINA.

"The inauguration of the Harvard Medical School of China occurred precisely at the moment of the outbreak of the Revolution of 1911; but this, instead of hindering the development of the School, worked to its advantage. Along with the remarkable readjustment of government, there was a widespread awakening on the part of the Chinese to the necessity of a hygienic regeneration, if China is to take her rightful place among the nations. This realization, however, had really begun during the fight against the recent outbreak of pneumonic plague in Manchuria, which marked a new era in medicine throughout China's four hundred millions of people.

"The point of location, at Shanghai, offers exceptional opportunities for extended researches into the diseases of the Orient and the tropics. This is of importance to us due to the rapidly increasing intercourse, commercial and otherwise, of the United States with the peoples of the Orient and tropical countries. The approaching opening of the Panama Canal emphasizes this need.

"The course of study at the Harvard Medical School of China covers a five-year period, the teaching all being done in English. Although the school is primarily for Chinese, it is open to all who meet the entrance requirements. It is the aim of the school to give a high class of instruction to a limited number of well-qualified students who give promise of becoming leaders in China's medical advance, rather than to turn out large numbers of moderately trained doctors.

"The above buildings are furnished to the Harvard Medical School, free of rent, by the Chinese Red Cross Society. The larger building now provides facilities for the hospital, the lecture and laboratory rooms for instruction purposes, and the laboratories for research. The whole of this building, however, is needed for purposes of instruction and research, and will be so used upon the completion of the much-needed new hospital. The smaller building is used as a dormitory. The grounds afford ample space for tennis and other sports enjoyed by the students.

"The purchase of a tract of land near the school building on which to erect the new hospital is of vital importance. The money for the hospital building has already been promised. The carrying on of satisfactory instruction work for the students further demands the immediate establishment of an out-patient department in the heart of the city.

"The school has before it exceptional opportunities for usefulness; and, in the words of President Eliot, 'is one of undoubted worthiness and sure fruitfulness.'"

The need for trained physicians in China is great. The country has a population of 400,000,000, with only 650 doctors having a knowledge of modern scientific medicine. At this rate there would be but one physician in Boston and three in Chicago. Yet physicians are needed in China, for there is a large amount of endemic and epidemic disease.

"The Harvard Medical School of China aims to meet this need, to train carefully selected Chinese students of medicine, so that they later may

become the teachers, in native institutions, where the vast number of Chinese practitioners needed may receive their training. The aim is to help the Chinese to solve their own medical problem."

There is also a great need for hospitals in China. There are at present 250 hospitals averaging 30 beds each in that country. At this rate, Boston would have one hospital of 12 beds and New York one of 90 beds. The Harvard Medical School Hospital, soon to be built at Shanghai, is not solely an attempt to contribute towards meeting this need, but a means for providing more adequate opportunity for clinical instruction under favorable conditions.

The need of this hospital, both from the humanitarian and from the educational standpoint, is obvious. It is earnestly to be hoped that not only graduates of the Harvard Medical School, but physicians and patrons of medicine generally, may generously give the means to make possible this enlargement of the work and service of the institution in the Orient.

THE MIDWIFE IN ENGLAND AND IN AMERICA.

In another column of this issue of the Journal is published a review of a pamphlet which has recently come to hand. Its title is "The Midwife in England"; its object is the midwife in and for America. It is important to consider briefly the motive behind these written pages.

Miss Van Blarcom, the secretary of the Committee for the Prevention of Blindness, is a well-trained obstetric nurse; no one could be more familiar with this side of obstetric work than she. She was sent to England to investigate the midwife situation in that country; her time for study was but six weeks. There can be no doubt that she did her work thoroughly and well. She became in spirit an English midwife and writes with the loyalty of a proselyte. She honestly feels that the one and only solution of the obstetrical situation in America is some such system as England has adopted. She considers no alternative and bravely sweeps away all the barriers. We cannot but admire her enthusiasm and pardon her inconsistencies; but it is hard to see how obstetricians of wide training and influence can advocate her plans for America.

In the first place, the English system is far from being the unqualified success she would have us believe. In a lecture on "Ante-Natal Hygiene," by Dr. Armand Routh, consulting obstetric physician to Charing Cross Hospital, given on behalf of the National Association for the Prevention of Infant Mortality on January 13, 1914, one of the first principles advocated is for "arrangements by which every poor woman shall have medical supervision during pregnancy." In this long and exhaustive paper there is no mention made of even the most highly trained midwife as a factor in his plans for obstetric care of the poor; it is always the medical practitioner who is to give the service. The obstetricians in England know that the system they originally advocated, when they backed the Midwife Bill, is wrong, and that it cannot furnish adequate care for the poor of England in their obstetric experiences.

The crying need in America is not for trained midwives, but for higher standards of obstetric teaching in our medical schools and for the widespread introduction of obstetric dispensaries. A recent newspaper article written, not by a superficial reformer, nor by a biased obstetric specialist, but by a public health expert, Dr. W. A. Evans, of Chicago, concludes:

"It does no good to abuse midwives or poor doctors or poor nurses. It does no good to try to legislate midwives into trained women, or, following the other trend, to legislate them out of existence. The latter plan has not succeeded anywhere in this country, and the former plan has not succeeded anywhere in Europe. The reason is plain to anyone who gives it thought. I will not develop it.

"No plan ever will succeed except one of substitution. The thing substituted must not only save the eyes and the lives, but it must conform to other requirements.

"The lying-in hospital, dispensary, and mothers' aid movement constitute the best substitute to date. As a preventive of blindness, it is perfect. As a saver of lives of mothers and babies, it is almost perfect."

MEDICAL LEGISLATION. STATE REGISTRATION IN MEDICINE.

On Thursday, March 5, a hearing was held at the State House before the committee on public health relative to the proposed bill providing for the registration of physicians in this Commonwealth. The principal contention was made by the Christian Scientists. The proposed

bill contains ten sections, the ninth of which read originally as follows:

"Nothing in this act shall be held to restrict the practice of Christian Scientists, so called, who are communicants in good and regular standing in any Christian Science church in this Commonwealth, or to registered pharmacists or registered dentists, or to clairvoyants, or to persons practising hypnotism, mind cure or massage, provided they do not violate any of the preceding provisions of this act."

To the last clause of this paragraph the Christian Scientists objected, claiming that it in effect nullified all the rest of the section. After some conference between their representatives and those of the State Board of Registration in Medicine, the latter agreed to substitute for this section the following:

"Nothing in this act shall be held to apply to registered pharmacists, registered dentists, or registered optometrists, or to restrain the practice of clairvoyance, hypnotism or mind cure, or to apply to any person who ministers to or treats the sick or suffering by mental or spiritual means without the use of drugs or material remedy."

Upon this compromise, the Scientists withdrew their objections, and the latter section was therefore substituted as an amendment to the bill.

The last section of the bill is also of importance as defining the practise of medicine.

"Section 10. The word medicine, as used in this act, shall be regarded as referring only to that branch of science which relates to the prevention, cure or alleviation of the diseases of the human body, and any person shall be regarded as practising medicine within the meaning of section 8 of this chapter who shall publicly assume or advertise any title or designation which shall show or tend to show that the person publicly assuming or advertising the same is a practitioner of medicine in one or more of its branches; or who shall investigate or diagnosticate physical ailments, defects or conditions of any person, with a view to treat or modify the same, or does treat or modify the same, by use of instruments or external appliances or manipulations, or by the application or administration of any remedial agent or substance for either internal or external effect, except in so far as the provisions of this section do not conflict with the provisions of exemption in section nine."

Hitherto there has been no statutory definition of the practise of medicine, and the term has been variously interpreted by different judges. This new definition, it is said, will be of value to the courts as an aid in the adjudication of certain medical cases.

MEDICAL EXAMINERS FOR GREATER NEW YORK.

THE bill recently introduced into the New York Legislature abolishing the office of coroner in New York City and substituting for it that of medical examiner is a reform measure deserving of a most widespread interest. It is now nearly forty years since the General Court of Massachusetts without a dissenting voice voted to abolish the coroner system and to substitute for it the method of medico-legal inquiry at present operative in this Commonwealth.

The office of coroner, an ancient English institution, in these days is an anachronism. Notwithstanding this fact, in but a few states of the Union has it been replaced by other systems of medico-legal inquiry. Massachusetts, the pioneer, has been followed by Rhode Island, and in a measure by Connecticut, New Hampshire and Maine. New York now seeks to follow suit, and in so far as the City of Greater New York is concerned to rid herself of the antiquated, cumbersome and in a measure corrupt method of inquiry which up to the present time has persisted in spite of all effort to abolish it.

The people of Massachusetts may well take pride in the fact that the promoters of the New York bill before drafting the measure made careful inquiry into the Massachusetts medical examiner system and its workings as exemplified in Suffolk County, where conditions are favorable to its most effective operation.

The friends of the bill include organizations representing a wide variety of interests united in vigorous effort to secure its passage. Should the bill become a law, New York will set a powerful example in the direction of a reform, the need of which in this country is universally conceded.

MEDICAL NOTES.

SYNTHETIC MILK.—A press report from London on March 17 announces the discovery there of a method of making synthetic milk from the soya bean.

A CENTENARIAN COUNTESS.—Elizabeth Ruth, Countess of Devon, who died at Cheltenham, England, on March 17, is said to have been born on March 12, 1814. She was widow of the tenth Earl of Devon.

The Plague in Java.—The total number of cases of bubonic plague notified in East Java during the calendar year 1913, was 11,218, with 10,556 fatalities.

Mississippi Valley Medical Society.—The twenty-sixth semi-annual meeting of the Mississippi Valley Medical Society was held at Lincoln, Neb., on March 26 and 27.

Insanity in Wars.—During the Franco-Prussian War, the percentage of insanity among troops engaged was 0.73 per 1000. During the British South African War it was 2.5; in the Russo-Japanese War 2., and in the recent Balkan War only 0.35.

A Long Retained Lithopedion.—In the issue of the Journal for Jan. 15 we quoted a case of a lithopedion retained in the abdomen for 42 years and during four succeeding pregnancies. In a letter published in the issue of the *Lancet* for Feb. 28, Dr. W. S. Lamb notes that there is in the Army Medical Museum, at Washington, D. C., a lithopedion removed at autopsy, which was retained in the abdomen 55 years and during five succeeding pregnancies.

BOSTON AND NEW ENGLAND.

New Evening Clinic at the Dispensary.—On March 16 a new evening genito-urinary clinic was opened at the Boston Dispensary. This clinic will be held on Monday, Wednesday, and Friday, at 7.30 p.m., and a fee of 50 cents will be required of each patient. The clinic will be in charge of Dr. Arthur H. Crosbie and Dr. Augustus Riley.

Scarlet Fever at Bridgewater.—It is announced by the local board of health that the epidemic of scarlet fever, recently prevalent in Bridgewater, Mass., is now abating. On March 13, there remained only 32 cases of the disease under treatment.

Hospital Bequests.—The will of the late Francis J. Cotting, of Boston, which was filed on March 18, contains bequests of $10,000 to the Children's Hospital, Boston, and $75,000 to the Industrial School for Crippled and Deformed Children.

By the death, on March 15, of Mrs. Abram H. Cushman, of Peabody, Mass., a trust fund of $40,000, of which she enjoyed the income, under the will of the late J. B. Thomas, now reverts to the J. B. Thomas Hospital.

The will of the late Laura Wolcott Lowndes, of Washington, D. C., which was filed in that city on March 14, contains a bequest of $10,000 to Harvard College to provide free beds for needy students in the Stillman Infirmary.

The will of the late Dr. Thomas Morgan Rotch, of Boston, after providing for the endowment of a professorship of pediatrics in the Harvard Medical School, makes the Infants' Hospital his sole ultimate reversionary legatee.

The will of the late Martha B. Webb, of Brookline, Mass., which was filed last week at the Norfolk probate court in Dedham, Mass., contains a provisional residuary bequest to the Beverly, (Mass.) Hospital.

Infectious Diseases.—Cases of Infectious diseases reported to the Boston Board of Health for the week ending March 17, 1914: Diphtheria, 59, of which 5 were non-residents; scarlatina, 144, of which 11 were non-residents; typhoid fever, 3; measles, 57, of which 1 was non-resident; tuberculosis, 42, of which 1 was non-resident.

The death-rate of the reported deaths for the week was 16.32.

NEW YORK.

Abolition of Coroner's Office.—On March 11 the Assembly Committee on Cities gave a hearing at Albany on the Brennan bill abolishing the office of coroner in New York City. Under this bill the bulk of the work now done by the coroners would be taken over by a chief medical examiner appointed by the mayor and a number of deputies appointed by the chief examiner, while the rest of the work would be performed by the city magistrates. Dr. George B. Magrath, medical examiner in Boston, explained the economical and satisfactory working of the medical examiner system in Massachusetts, and among those who appeared in favor of the bill were Dr. A. Jacobi and Prof. James Ewing of Cornell University Medical College.

Hospital Bequest.—By the will of the late Mrs. Elizabeth N. Andreas of Brooklyn, N. Y., $4,000 each is left to the Stony Wold Sanatorium for Incipient Tuberculosis, in the Adirondacks, St. Rose's Free Home for Incurable Cancer, New York, and the Seaside Home of the Brooklyn Children's Aid Society.

Manhattan State Hospital.—After several years of negotiations, an agreement has been

approved by the state and the city of New York giving to the state a lease of Ward's Island for fifty years for the Manhattan State Hospital for the Insane and transferring to the state the property in Brooklyn occupied by the Long Island State Hospital. The transactions were made possible through the enactment of two bills by the Legislature last year, upon the recommendation of the attorney general and the State Hospital Commission. The Manhattan hospital has been located for many years on Ward's Island without definite legal right, and during its occupancy the state has expended some $1,238,500 for improvement and repairs of existing buildings and the erection of new buildings.

NEW STATE HOSPITALS.—Among the recommendations in the annual report of the State Board of Charities is the establishment of two new institutions for the delinquent feeble-minded, one for each sex, with observation stations in New York, Buffalo and other cities. Another recommendation is the establishment of at least three state hospitals for incipient tuberculosis, similar to the one at Raybrook, in the Adirondacks, together with increased hospital provision for the care of advanced cases of the disease.

REËNACTMENT OF WORKMEN'S COMPENSATION.—The constitutionality of the workmen's compensation act passed in December last having been questioned, the present legislature, at the request of Governor Glynn, reënacted it, with slight changes, and on March 16 the governor signed the bill and appointed four of the five commissioners whose function it is to administer the law. One of these is Dr. Thomas Darlington, the former head of the New York City Health Department.

TRUTH AND ANTI-VIVISECTIONISTS.—The general public has long realized that many of the charges made by anti-vivisectionists against the medical profession are utterly silly. How much credence can be placed in their recent charges that children treated in hospitals of this city were inoculated with "loathsome diseases," even though such charges are apparently fully supported by a statement giving names and addresses of the children alleged to have been so infected, is well shown in some correspondence which Commissioner Goldwater has recently had with Dr. William H. Maxwell, City Superintendent of Schools. Not only were the children found not to be suffering from the "loathsome diseases," but it was also shown that there was absolutely no experimental work with such diseases carried on in any of these hospitals of the Department of Health.

The charge was also made that many of the children attending the public schools in the Bronx were suffering from venereal diseases and it was plainly intimated that these were due to experimentation and infection in city hospitals. In particular, B. S. Deutsch addressed a letter to the District Attorney of Bronx County, stating that forty-eight children residing in Bronx County, many of whom were now attending the public schools, were suffering from a very grave venereal disease, namely, syphilis. Mr. Deutsch's statement goes on to say that the alleged infections of these children were the result of "inoculation which occurs without the consent of either the children or their parents, or else as the result of gross negligence or carelessness within the hospitals."

Commissioner Goldwater's investigators visited forty families named in the Deutsch list. Of this number, fifteen could not be found at the given addresses. Interviews were obtained with twenty-five families in which there were thirty-four children. Among these, not a single case of syphilis or of suspected syphilis was found. There was no evidence of the inoculation of any of those children with serum or vaccine.

RESTRICTION OF CORROSIVE SUBLIMATE SALES.—Report from Albany states that on March 5 the Senate committee reported favorably the Blauvelt bill, which restricts the sale of corrosive sublimate tablets by providing that they shall be colored green, placed in a bottle of distinctive shape, and dispensed only on a physician's prescription.

ANOTHER CASE OF TYPHUS FEVER.—On March 9 a case of typhus fever was discovered aboard the French steamer *La Savoie,* which reached this port on the previous day from Havre. All her steerage passengers were detained at the quarantine station.

MENINGITIS FROM GREECE.—A number of cases of cerebro-spinal meningitis have recently been discovered among immigrants from Greece, and

among Greek soldiers returning to this city after serving in the Balkan War. The disease is endemic in Greece, and there is probably a considerable risk of its introduction as an epidemic into this country. The vigilance of quarantine officials should be doubly strict at this time to prevent such a catastrophe.

City Health Department.—The officials of the City Health Department have expressed themselves as much gratified by the cordial support promised the department by the present municipal administration at a recent meeting arranged by the Charity Organization to celebrate the 31st anniversary. Three of the speakers on that occasion were Mayor Mitchel, Comptroller Prendergast, and Mr. McAneny, president of the board of aldermen, and looking to the commissioner of health to bring the machinery of his department to the highest degree of efficiency, they pledged themselves to give the heartiest support in their power to all efforts to improve the health and welfare of the community. Some of the activities commended by them were: Health centres, organized public health education, improvement in hospital and dispensary conditions, better supervision of foods, broadening of the work of the infant milk stations, and better supervision of and increased accommodations for the care of the tuberculous.

Treatment of Venereal Diseases.—The Health Department believes that Wassermann tests should be made upon all cases of syphilis, that there should be facilities for making microscopical examination for treponema, and that complement fixation tests and microscopical examinations for gonococci should be made in all cases of gonorrheal infection prior to discharging the patient. It has published a list of college, hospital and dispensary clinics which have taken special pains to come up to this standard, and expresses the hope that the example set by these will soon be followed by other clinics, and that in the near future the clinic treatment of the venereal diseases will be on a thoroughly scientific and satisfactory basis.

Medical Economic Leagues.—The Federation of Medical Economic Leagues, the object of which is the furtherance of the economic interests of the profession, and in which there are now seven organizations, with a membership of 2800, was incorporated at Albany on March 6. The president is Dr. Thomas Dixon of Brooklyn, and among the other incorporators and directors are Drs. A. C. Geyser and Oscar Potter of the Borough of Manhattan and Drs. M. L. Volk and Samuel Gitlow of the Borough of the Bronx. The chief aim of the central organization at this time is stated to be to induce the Legislature to prohibit hospitals and dispensaries from exacting fees from charity patients.

Award of Nicolls Medal.—On March 6 the Chemists' Club of New York presented the Williams H. Nicolls medal to Dr. M. Gomberg, professor of organic chemistry in the University of Michigan awarded for his researches in triphenylmethyl. On the same occasion friends of the late Dr. Morris Loeb presented to the club a bronze bust of Professor Loeb.

Current Literature

Medical Record.

March 7, 1914.

1. Case, J. T. *X-ray Observations on Colonic Peristalsis and Antiperistalsis with Special Reference to the Ileocolic Valve.*
2. Abbe, R. *A Simple Subcutaneous Cut to Cure "Trigger Finger" or "Snap Finger."*
3. Bassler, A. *A Cause of Peritoneal "Adhesions in a New Bacillus; the Bacillus Adhaesiformis.*
4. Wilensky, A. O. *Fracture of the Os Calcis.*
5. Einhorn, M. *An Appliance for the Introduction of Instruments into the Stomach.*
6. Kellogg, J. H. *The First Observed Cases of Friedreich's Ataxia in America.*
7. Weiss, R. *Quantitative Calorimetric Analysis in Aid of Clinical Diagnosis.*
8. Rueck, G. A. *Pathology, Etiology and Diagnosis of Typhoid Fever.*

New York Medical Journal.

March 7, 1914.

1. Smith, A. J. *Erosion of Tissues by Aneurysms.*
2. *Trimble, W. B. *Lingual Tuberculosis—Primary.*
3. May, C. H. *Soap and Water and Opticians.*
4. Cornwall, E. E. *Low Blood-Pressure.*
5. Willson, R. N. *Food Toxemia or American Gout.*
6. Diner, J. *Serum Diagnosis.*
7. Moss, M. I. *Heredity in Exophthalmic Goitre.*
8. Mahr, H. W. *A Special Burette for Use in the Rideal-Walker Test.*

2. Trimble reports two cases of primary lingual tuberculosis. In any case of tongue ulceration, he says, tuberculosis must be considered. Most tuberculous ulcers of this organ are secondary. The diagnosis of this condition is very difficult, as it is impossible to demonstrate the bacilli in the ulcer and histologic examination alone is practically useless as a means of distinguishing it from syphilis.

[L. D. C.]

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

MARCH 7, 1914.

1. KNOX, H. A. *A Scale, Based on the Work at Ellis Island, for Estimating Mental Defect.*
2. *EASTMAN, J. R. *An Anatomic and Physiologic Method of Short-Circuiting the Colon.*
3. GRIFFITH, J. D. *Progress of Orthopedic Surgery.*
4. DERCUM, F. X. *An Evaluation of the Psychogenic Factors in the Etiology of Mental Disease, Including a Review of Psychanalysis.*
5. KAHN, M. *Rupture of the Intestine, with Special Reference to Its Early Diagnosis.*
6. *KANAVEL, A. B. *Duodenal Toxemia Following Rupture of the Duodenum, with Remarks on Extraperitoneal Rupture and a Report of Two Cases.*
7. *VERHOEFF, F. H. *Ultraviolet Light as a Germicidal Agent. Experimental Investigation of Its Possible Therapeutic Value.*
8. *LIBMAN, E., AND OTTENBURY, R. *A Practical Method for Determining the Amount of Blood Passing Out During Direct Transfusion.*
9. FRANCINE, A. P. *The Underlying Factors in the Spread of Tuberculosis.*
10. HEED, C. R., AND PRICE, G. E. *Binasal Hemianopsia Occurring in the Course of Tabetic Optic Atrophy.*
11. EUSTACE, A. B., AND MCNEALY, R. W. *Case of Strangulated Tubo-Ovarian Hernia in an Infant.*
12. ZIGLER, M. *Gonorrheal Involvement of the Skin of the Prepuce Cured by Unusual Therapeusis.*
13. REED, E. N. *Idiosyncrasy to Aspirin (Acetylsalicylic Acid).*
14. POMEROY, J. L. *A New Sign in Pneumothorax, Particularly Artificial Pneumothorax.*
15. FENNELL, R. F. *Care of the Heart in Pneumonia.*
16. MCJUNKIN, F. A. *A Tube for Collecting Blood for Cultures.*
17. DAVID, V. C., AND CURTIS, A. H. *Recent Experiences with Blood Transfusion.*
18. HIRSCHFELDER, J. O. *A New Culture-Medium for the Gonococcus.*

2. Eastman suggests the anastamosis of the caput coli with the upper rectum as a new method of short-circuiting the colon and getting certain and efficient drainage.

6. Kanavel is convinced that a toxemia other than bacterial is a factor in the mortality of extraperitoneal rupture of the duodenum. He refers to the well-known work of Maury and to two illustrative cases.

7. Verhoeff proves experimentally that ultraviolet light cannot under any conditions destroy bacteria within the cornea, even when the latter is perfectly transparent, without at the same time severely injuring the corneal tissue.

8. The authors have worked out a formula which involves body weight before and after transfusion, and hemoglobin per cent., whereby the exact amount of blood transfused can be measured. They claim it is always safe to take one-fourth of the donor's blood and often safe to take a third, provided the transfusion is not done too quickly. The patient's blood-weight is estimated as one-nineteenth of the body weight. [E. H. R.]

THE ARCHIVES OF INTERNAL MEDICINE.

JANUARY, 1914.

1. *STEWART, G. N. *Studies on the Circulation in Man. The Blood-Flow in the Hands in Diseases of the Heart.*
2. *BASS, M. H., AND WESSLER, H. *A Study of the Blood-Pressure in Children Showing Orthostatic Albuminura.*
3. SATTERLEE, H. S., AND HOOKER, R. S. *Experiments to Develop a More Widely Useful Method of Blood Transfusion.*
4. *HOWELL, W. H. *The Condition of the Blood in Hemophilia, Thrombosis, and Purpura.*
5. *GEYELIN, H. R. *A Clinical Study of Amylase in the Urine, with Special Reference to the Phenolsulphonephthalein Test.*
6. SCHMIDT, H. B. *The Clinical Study of Hypercholesterinemia.*
7. *SOPER, W. E., AND GRANAT, S. *The Urea Content of the Spinal Fluid with Special Reference to Its Diagnostic and Prognostic Significance. A Series of Ninety-Seven Cases.*
8. *THOMAS, B. A., AND IVY, R. *The Gonococcus Complement Fixation Test and Analysis of Results from Its Use.*
9. PLAGGEMEYER, H. W., AND MARSHALL, E. K. *A Comparison of the Excretory Power of the Skin with That of the Kidney Through a Study of Human Sweat.*
10. EMERSON, H. *Status Lymphaticus in Adults, Its Clinical Diagnosis and Importance.*

1. Stewart reports on a clinical study of the circulation in the hands in cases of heart disease. He finds that the hand flow is more apt to be markedly deficient where there is evidence of serious impairment of the myocardium with disturbance of force and rhythm, than in cases with gross valvular lesions where the heart action is strong and steady. This is true even when in valvular disease clinical signs of broken compensation are present. In aortic insufficiency the hand flow is less easily maintained at the normal level than in mitral insufficiency. Even where there is considerable venous engorgement in cardiac cases the flow in the hands may be little if at all diminished, provided the myocardium is not impaired, and a diminution of the flow in the course of such cases is often an indication of impending myocardial failure.

2. Bass and Wessler studied the blood-pressure in children, showing orthostatic albuminuria. They found that blood pressure in these cases varied very little from that of normal children.

4. Howell reports on a clinical study of the blood in hemophilia, thrombosis and purpura. In hemophilia, he says, the blood is deficient in prothrombin, and there is a relative excess of antithrombin. The detection of a hemophilic condition of the blood is facilitated by first oxalating the blood and then recalcifying with an optimum amount of calcium. Under these conditions the coagulation time of normal plasma is very constant (9 to 12 minutes), while that of hemophilic blood is greatly delayed. In spontaneous venous thrombosis there is evidence of a diminution in the antithrombin of the blood, with normal prothrombin. In purpura no evidence was found of any variation from normal in either the antithrombin or prothrombin.

5. Geyelin reports on a clinical study of amylase (diastase) in the urine. The amount of this enzyme in the twenty-four-hour specimen of a normal individual (estimated by the Wohlgemuth starch-iodine method) varies within very narrow limits, and for a given case is almost a constant factor. In the vast majority of cases of acute or chronic nephritis the diastatic value of the urine is subnormal or totally absent. In cases with marked albuminuria it may be normal, indicating that the presence of albumin increases enzyme activity. Allowance must always be made for this factor in estimating the diastatic value in nephritic urine. As a test for renal function in nephritis, this method gives results agreeing remarkably well with those of the phenolsulphonephthalein test.

7. Soper and Granat studied the urea-content of the spinal fluid and its diagnostic and prognostic

significance. They find that a urea content higher than 0.2% indicates a severe uremia and a rapidly fatal termination. A content between 0.1% and 0.2% means a rapidly fatal termination in the majority of cases of nephritis. A content between 0.05% and 0.1% suggests severe urea retention.

8. Thomas and Ivy made a careful clinical study of the gonococcus complement-fixation test. They believe that a positive reaction is invariably reliable and always denotes the presence of a focus of gonococcic infection. The reaction is often negative in acute and subacute urethritis, especially if the inflammation is limited to the anterior urethra. In chronic posterior urethritis, in epididymitis, and in arthritis the reaction is practically always positive; in stricture about two-thirds, in chronic prostatitis about one-half of the reactions are positive. In women reactions are negative unless the infection ascends to the level of the uterus. A positive reaction is present in about 20% of patients clinically cured. [L. D. C.]

THE PRACTITIONER.

FEBRUARY, 1914.

1. *HUNTER, W. *Oral Sepsis in Relationship to "Septic Anemia."*
2. *GUTHRIE, L., ET AL. *The State Registration of Venereal Diseases.*
3. NITCH, C. A. R. *Some Important Points in the Symptoms, Diagnosis and Treatment of Haemic Infections of the Kidney.*
4. MORLEY, A. S. *Injuries of the Back.*
5. *RIVIÈRE, J. *Diabetes and Its Treatment by Means of Physical Agents.*
6. BLAKEWAY, H. *The Treatment of Harelip and Cleft Palate.*
7. THOMSON, H. C. *Recent Work on Diseases of the Nervous System.*
8. FINZI, N. S. *Recent Work on Radio-Therapeutics and Electro-Therapeutics.*
9. BUNCH, J. L. *Some Continental Methods of Treating Syphilis.*
10. BRUCE-POTTER, H. E. B. *Intravenous Injections in Blackwater Fever.*
11. LOVELL, A. G. H. *Hay-Fever.*
12. *HUSSY, J. B. *Pulmonary Tuberculosis and Its Vicious Circles.*
13. DOUGLAS, A. *Further Notes on Mental Suggestion by Transference.*

1. Hunter believes that many of the anemias are due to a septic process going on somewhere in the body, producing poisons which cause the anemia. These, and their relationship to oral sepsis, he proceeds to discuss. Much of the paper dwells upon the author's own work, and the justification and importance of this. It is picturesquely written and presents many important points in a novel way, though presenting little that was not already known. He presents his conclusions in an elaborate and overcomplex table.

2. Guthrie and six others discuss the registration of syphilis and gonorrhea. With one exception they are agreed that such registration under conditions as they now exist in England will not produce any good results.

5. Rivière urges further use of physical agents in treating diabetes. Among others he considers hydro-, mechano- and electro-therapy. These should, of course, go along with the regular dietetic regime.

12. Hussy, in an interesting paper, presents and discusses many of the problems arising in the course of pulmonary tuberculosis as vicious circles. He points out how, for instance, social misery, poor housing, etc., gives rise to tuberculosis, which in turn causes more social misery; the disease causes a cough, which in turn spreads the disease; fever makes the patient chilly so that he stays indoors, which in turn is bad for the tuberculosis and causes more fever. Likewise in regard to emaciation, hemoptysis, dyspepsia, anemia, night sweats, neurasthenia, pleurisy, cardiac failure and others he points out how a vicious circle may be formed and then discusses how it may be broken. [J. B. H.]

THE INDIAN MEDICAL GAZETTE.

FEBRUARY, 1914.

1. *ROGERS, L. *Gleanings from the Calcutta Post-Mortem records. No. VIII.*
2. HEHIR, P. *Venereal Disease in the Army of Our Indian Empire.*
3. HOSSACK, W. C. *Preliminary Note on Asino-Vaccine.*
4. BOORSMA, W. G. *The Kernels of "Canarium Commune" as an Addition to Milk in Infant Feeding.*
5. GREEN-ARMYTAGE, V. B. *The Use and Abuse of Pessaries. A Clinical Lecture.*
6. CHITALE, P. K. *Night-Blindness; Its Causes, Signs, Symptoms, and Treatment.*
7. MURISON, C. C. *How to Keep Flies Off Edible Articles for Sale.*
8. NEWMAN, E. A. R. *A Portable High Pressure Sterilizer.*
9. PANDALAI, K. G. *A Case of Salvarsan Poisoning.*
10. FINK, L. *Case of Transient Hemiplegia.*

1. In this concluding paper of his series, Rogers discusses the primary causes of death and the most frequent errors of diagnosis in 1000 medical autopsies. Over one-third of the deaths was due to tropic diseases. [R. M. G.]

MÜNCHENER MEDIZINISCHE WOCHENSCHRIFT.

NO. 7. FEBRUARY 17, 1914.

1. HEILBRONNER, K. *Introspection as a Symptom of Pathological Conditions.*
2. *VOELKEL, E. *The Diagnosis of Infectious Diseases by Abderhalden's Method.*
3. SINGER, H. *The Specificity of Abderhalden's Dialysis Method.*
4. SCHWENBECHER, A. *Lead Poisoning from Drinking Water.*
5. RIMPAU. *A Milk-Borne Typhoid Epidemic in Munich During August, 1913.*
6. BITTROLFF, R. *The Treatment of Tuberculosis of the Ribs and Sternum by X-rays.*
7. WEGENER, W. *The Feeding of Infants with Larosan.*
8. FINGERHUT, L., AND WINTZ, H. *A Method for Determining Coagulation Time.*
9. DE WAELE, H. *The Technic of Abderhalden's Dialysis Test.*
10. KROH, F. *The Treatment of Peritoneal Adhesions.*
11. *SCHMIDT, W. *The Lack of Susceptibility to Adrenalin on the Part of Dementia Precox Patients.*
12. KOHRS, T. *A Fatal Case of Acute Encephalitis Following the Injection of Salvarsan.*
13. V. ZEZSCHWITZ. *A Case of Hemorrhagic Pancreatitis.*
14. KRAEMER, F. *An Aseptic Bandage for Surgical Emergencies.*
15. EMMERICH, R., AND LOEW, O. *The Treatment of Hay-Fever by Continued Doses of Potassium Chloride.*

2. Voelkel, according to Abderhalden's theory, made peptone-free extracts from diphtheria, anthrax, and typhoid bacilli, from certain trypanosomes and from the spirocheta pallida. He tested the serum of animals or patients infected with these organisms

against their extracts to discover the presence of specific proteolytic ferments.

The sera of animals and patients infected with typhoid were capable of splitting the typhoid bacillus albumin. Negative results were obtained in anthrax, diphtheria and trypanosomiasis. In a few syphilitic patients the serum split the albumin of the spirocheta pallida. In these cases the Wassermann reaction was strongly positive. Thus Voelkel concludes that in certain infections, the diseased serum has the power of forming peptone from an extract of the infecting agent.

11. In psychiatry, during recent years, considerable attention has been paid to the glands of internal secretion as having an influence on the symptoms encountered. Schmidt conducted the following investigations on 34 cases of dementia precox, and on 36 normal individuals or patients suffering from other psychoses. Blood-pressure determinations were made before, and at intervals after, the intramuscular injection of .4-.5 of a milligram of adrenalin. Schmidt found that the control cases reacted to this dose by a rise in blood-pressure of from 40-80 millimeters of mercury. None of the dementia precox patients showed an increase of more than 20 millimeters of blood-pressure, while the severer and acuter cases showed no change. Schmidt concludes that lack of susceptibility to adrenalin is a means of differential diagnosis between circulatory and catatonic stupors. He does not attempt to explain his findings. [R. F.]

No. 8. FEBRUARY 24, 1914.

1. ABDERHALDEN, E. *Further Studies in the Specific Action of the So-called Protective Ferments.*
2. HILNER, E., AND POENSGER, F. *The Occurrence of Albumin Splitting Ferments in the Blood of Starving Animals During the Increased Nitrogen Excretion from Fat Destruction.*
3. *JACOB, L. *Clinical Signs of Staphylococcus Sepsis.*
4. SEHRT, E. *The Relation of Thyroid Insufficiency to Nervous Symptoms and Spastic Obstipation in Women.*
5. *WELZ, A. *Erysipelas as an Etiological Factor in Diabetes Mellitus.*
6. JUNGMANN, P. *The Anemia of Pregnancy.*
7. HABERMANN, R. *Intravenous Injections of Arthigonin in the Diagnosis and Treatment of Gonorrhea.*
8. SCHWARZ, A. *A Quick and Certain Remedy for Toothache and Earache.*
9. VOERNER. *Isapogen.*
10. STRAUCH, A. *Cough Produced by a Persistent Ductus Lingualis.*
11. PÜRCKHAUER, R., AND MAUSS, T. *A Case of Polyneuritis with Korsakow's Psychosis Ending Fatally and Following Neosalvarsan.*
12. BENDER, G. *Grape juice as a Food and Medicine.*
13. OELLER, H., AND STEPHAN R. *The Value of the Dialysis Method in Clinical and Serological Studies.*

3. Jacob reviews the literature on staphylococcus septicemia and reports eight cases of his own. Of these, three were due to primary osteomyelitis or paranephritic abscess, and ran a typical clinical course. The portal of entry in the other cases was unusual, arising from infected tonsils, from the intestinal canal, or from bronchiectatic cavities in the lung. Jacob reports this series to emphasize the importance of bacteriological investigation of blood and urine for the diagnosis and prognosis of all fevers of obscure origin. According to his observations, blood or urine cultures were positive in every instance, and the number of colonies which were recovered were in a general way parallel to the clinical severity of the disease.

5. It is recognized that various infections have seemed to be an etiological factor in diabetes mellitus. Welz reports two cases of erysipelas which developed typical diabetes a short while after recovery. One case came to autopsy and was found to have cirrhosis of the liver and degeneration of the islands of Langerhans in the pancreas.

In his discussion Welz admits that it is difficult to prove that the erysipelas was related definitely to the production of the diabetes. Nevertheless, he considers that the infection in his patients was the exogenous cause of the constitutional disease, according to Naunyn's theory that the majority of diabetics show a congenital defect in carbohydrate metabolism which leads to a true insufficiency upon the imposition of a variety of other factors. [R. F.]

BERLINER KLINISCHE WOCHENSCHRIFT.

No. 3. JANUARY 19, 1914.

1. BESREDKA. *Vaccination with Sensitized Virus.*
2. BRIEGER AND KRAUSE. *Further Communication on "Tryposafrol" and "Novotryposafrol."*
3. *BRÜCKNER. *The Cure of a Case of Tuberculous Peritonitis by the Injection of Nitrogen Gas into the Abdominal Cavity.*
4. PARTSCH. *Temporary Resection of the Palate, to Gain Access to the Naso-pharynx.*
5. LUDLOFF. *Experiences and Results with Open Reduction of Congenital Dislocation of the Hip.*
6. SIMON. *The Development of Sarcoma Following Photo-therapeutic Measures (Quartz-lamp).*
7. STODLER. *The Magnesium Sulphate Treatment of Tetanus.*
8. BARTSCH. *Accidents in Sports.*
9. LISSAUER. *Experimental Cirrhosis of the Liver.*

3. The author reports a striking cure by this means, which has also been tried and reported by Mosetig-Moorhof, Nolen, Folet, and Schmidt and Meyer. The patient was a young man of 16, who in spite of two laparotomies with the evacuation of respectively 6 liters and 2 liters of ascitic fluid, and in spite also of hygienic treatment, was becoming consistently worse. There was marked thickening of the peritoneum and omentum, and stubborn ascites. Between March 6, 1913, and May 17, 1913, he had four injections of the nitrogen gas varying from 500 c.c. to 800 c.c. in amount. On Nov. 13, 1913, he presented himself as symptomatically cured, and feeling perfectly well. The physical examination was negative save that in one area the now slightly thickened omentum could be felt. The abdomen was soft. This case seems like an authentic cure, especially as the amelioration in the symptoms and signs began immediately after the first injection. [R. H. M.]

No. 4. JANUARY 26, 1914.

1. *KÜTTNER. *Intestinal Colic—The So-called Umbilical Colic of Children (E. Moro).*
2. STADLER AND LEHMANN. *Animal Experimentation in the Treatment of Tetanus with Magnesium Sulphate.*
3. CASSEL. *Staphylococcus Pyemia Following Furunculosis.*
4. MÜLLER. *A Case of Torticollis Due to Bony Deformity.*
5. *ARNETH, *Thorium-X in Pernicious Anemia.*
6. BRIEGER. *The Treatment of Sciatica by a Combination of Physico- and Hydrotherapeutic Measures.*
7. GHIRON. *The Kidney Function in Reflex Anuria.*
8. LISSAUER. *Experimental Cirrhosis of the Liver (Concluded).*

1. Moro of Heidelberg has described a condition of periodic recurrent colic in the region of the umbilicus, in children over four, which he calls "recurrent umbilical colic." The pain is sharp comes on very suddenly lasts only a few hours and may or may not be accompanied by vomiting. The pain is always confined to the region of the umbilicus. Moro says that these cases are usually entirely functional and due to a neuropathic disposition, though occasionally there is an objective finding, such as diastasis of the recti, or chronic obstipation. Küttner disputes these remarks, and reports six of these cases entirely cured by appendectomy. In his opinion Moro is wrong in saying that the condition is commonly a neurosis, and he claims that the majority of cases can be cured by removal of the appendix.

5. Arneth reports a case of pernicious anemia in a woman of 67 treated with thorium-x at frequent intervals for a period of a little over two months, with the following results: The red cells went from 1,904,000 to 3,064,000, the leucocytes from 1000 to 4200, and the hemoglobin from 42% to 70%. The subjective symptoms were improved. [R. H. M.]

Miscellany.

MEMORIALS.

THE Fellows of the Norfolk District of the Massachusetts Medical Society in the recent decease of our respected member, Roderick McLennan, M.D., adopted for record the following memorials:

RODERICK MCLENNAN, M.D.

Dr. Roderick McLennan came to Quincy in 1887, in his early manhood, gave to its people his entire professional life and was removed from their midst at the age of man's maturest judgment and safest and most valuable action.

Modest and retiring in manner, he was without fear in action, ever thoughtful and respectful of the welfare of the society and its members.

Never striving for external show, yet ever ready to advise and suggest where his wisdom and opinion were required. Never aspiring to public office, he was a valuable member of the medical and surgical staff of the Quincy City Hospital from its inception; also giving his valuable time and services to offices in our local society.

Of deep and broad training, with a store of wisdom and good judgment gleaned therefrom. Ever ready to give assistance to colleague and patient.

His presence will be missed at our meetings, at our hospital and in the sick room. His cordial salute, the hearty grasp of hand has gone, but the memory of the good physician will remain in the hearts of his colleagues whom he honored in life.

The members of the society extend to his bereaved family their heartfelt sympathy in their great affliction. To those to whom he gave unstintingly and unselfishly of his services as the good Samaritan, condolence is extended at this time.

Resolved, That this memorial be spread on the records of the society and a copy be sent to the bereaved family.

JOHN H. ASH, M.D.,
E. H. BUSHNELL, M.D.,
D. A. BRUCE, M.D.,
Committee on Resolutions.

At a meeting of the Norfolk South District Medical Society the following memorial was adopted:

JOHN FREDERICK WELSH, M.D.

Deeply sensible of its loss by the death of Dr. John Frederick Welch of Quincy, the Norfolk South District Medical Society desires to record the great respect and high esteem in which he was held.

Graduating in 1880 from Bellevue Hospital Medical College, his career is an example of a self-made man of the best type. Frank and outspoken in manner and ever loyal to his friends, he has always stood for honorable conduct and high ideals in the medical profession and in the community.

As a member of the society, for many years its secretary, and its president in 1905 and 1906, he has been active in its support, and his wise conservatism and good judgment have been invaluable. For more than a generation he has practised his profession with unceasing devotion, attaining a high reputation by his skill, and enlisting the love of his patients to a marked degree. Although no longer with us, his memory is an inspiration and his example forms a perpetual ideal for his associates.

JOHN A. GORDON, M.D.,
NATHANIEL S. HUNTING, M.D.,
OLIVER H. HOWE, M.D.,
Committee on Resolutions.

Correspondence.

RELATIVE TO THE REGISTRATION OF NURSES.

NATICK, MASS., March 17, 1914.

Mr. Editor: I have read with interest your editorials on House Bill 1186 in the JOURNAL for March 5 and 12, and would like to comment on two or three points:

1. The objection made by the opponents last year "that it would place too much power in the hands of the board."

2. "That similar training school inspection has proved of value and success in New York and Illinois, where it has already been adopted. Such examples are important arguments in its favor."

Last year's bill and also the one this year contain this provision: "Applicants for registration—must

have received a certificate of graduation from a training school—*considered reputable by the board*." (Italics are mine.) These bills were submitted to persons who have accurate knowledge as to the results of inspection elsewhere, and decided exceptions were taken to the clause italicised. One reply says: "I should seriously object to this clause because it places too much power in the hands of any board with absolutely no limitations. It is just such a clause which has caused much trouble in Illinois."

Another, who has had experience as hospital superintendent writes:

"I think there ought to be a clause somewhere that prescribes just how far the investigation may go. It will not be conceded that investigators of training schools will have any powers of regulation of the hospital administration, or equipment or architecture, and unless there is something specific put in your law, and unless the registration officers are an exceedingly high class group of people, there is likely to come disagreements about the scope of this investigation. In the case of a nurse inspector who had impressed herself on the members of the board, the board would relegate its duties to her and this would be hazardous. It is a good deal easier to safeguard the situation in the law itself than to presume on the personal factor in the enforcement of the law. Obviously, legislation must be taken independent of the personal equation."

It is evident that the opposition has very good company

The argument that any abuse of power by the board could be rendered nugatory by changing the personnel of the board, since it is appointive, is really an admission that such opportunity for abuse of power does exist in the proposed law. Would it not seem the part of wisdom to safeguard by law any abuse of power rather than to depend on changing the membership of the board?

One would hardly expect New York and Illinois physicians and hospital superintendents would oppose and criticise a training school inspection that "has proved of value and success in New York and Illinois, where it has been adopted." What are the facts?

I quote from a paper entitled "Some Problems in Relation to Nurses' Training Schools," read at an annual meeting of the New York State Medical Society by Dr. Charles Stover, as follows:

"We may not inaptly call this the era of control by the New York State Nurses' Association. . . . One of the tendencies in the United States is to plan the course of instruction for the evolution of hospital administrators, ignoring the public demand for ordinary and domestic nurses. . . . Only ten per cent. of the nursing outside of the hospital is done by them." (Meaning graduate nurses.) "Is this the best return that the hospitals can give the public that supports them? What has the nurse organization done to meet the crying needs of the poor and middle classes for nursing at a moderate cost? . . . Why should not this society of 6,762 members have a voice in the evolution of a more ideal nurses' training school?"

At this meeting a committee was appointed, consisting of Drs. Stover, ex-president of the society, Egbert LeFevre, dean of the University and Bellevue Medical College, Alexander Lambert, professor in Cornell Medical College, and Roswell Park, of Buffalo, the famous surgeon. In its report the committee says: "It is a fair conclusion that the standard for entrance in New York is too high for practical results. . . . It is more important that the people have small hospitals than that a few highly trained nurses obtain the thus-far little coveted title of R.N. . . . Meanwhile your committee is of the opinion that the State should recognize the nurse problem as an experimental one, to be regulated at present by wise adminstration rather than by legislation."

In 1912 the Executive Committee of the Hospital Conference of the City of New York appointed a special Committee on the Training of Nurses to act with the President to secure either such modifications, or interpretations of the existing regulations "as shall render it possible for the hospitals of the city to continue the training of nurses in sufficient numbers to meet the demands for trained nursing service." This committee consisted of the superintendents of the Presbyterian, the Post-Graduate, the St. Luke's, the Roosevelt, the New York, the Methodist-Episcopal, the Bellevue and Allied, and the Mt. Sinai Hospitals. Space will not permit the report in full but it says, in part:

"The strict enforcement . . . governing the admission of probationers to registered training schools for nurses is impracticable. . . . It creates a dearth of pupils and hence of New York graduates. . . . We urge upon the Education Department such amendments as will give the authorities a freer hand in the selection of probationers."

It may properly be asked why do these physicians, and superintendents of hospitals representing 3000 beds, make such strong protests, if "the New York law is the best one in the United States"?

Emerson is reported to have said that "Justice is the fairest thing all around." The criticisms of the New York law would seem to show that it does not conform to Emerson's idea of justice.

The foregoing quotations are only a few of the many criticisms which I have, some of them personal letters, but these will suffice for now.

One might infer from your editorial of the 12th inst., that the State Board of Nurse Examiners is unanimous in its support of House Bill 1186, but that is not so. At the hearing, held on the 5th inst., one member of the board appeared in opposition.

All will agree that "The public needs protection against incompetent nurses as well as against incompetent physicians." But it is every year becoming more evident that registration of nurses protects only about one-tenth of the public, while the nine-tenths are left unprotected. It is self-evident that if any are entitled to legal protection those who are not able to pay the high fees of registered and trained nurses should receive at least equal consideration with those of abundant means. Today every state where nurses are registered virtually says to its inhabitants: "You who can pay the price can have the protection afforded by registration but you who can not pay the price must take your chances."

The time is nearing when "the public," which includes *all* the citizens, should demand legal protection against incompetency in any and all who nurse for hire, and this protection should embrace the poor as well as the rich.

In New York the standards which a training school must measure up to in order that its graduates may be allowed to take the examination for registration are so rigid that they debar the graduates of one of the best training schools in this state, yet those in authority acknowledge that the school in question gives an exceptionally fine training, and say to the school: "If you will promise to give two 'consecutive' years in the hospital instead of two years not necessarily consecutive, we will register your graduates, both past, present and future." This reminds one of John, the disciple, when he said to Jesus: "Teacher, we saw one casting out demons in thy name, and we forbade him, because he followed not us." Casting out demons, but not "following us." Training nurses successfully, but not "following us."

In the *Journal of the American Medical Association* for March 14 is a paper read at Chicago February 24, 1914, before the Tenth Annual Conference of the Council on Medical Education, by President Lowell of Harvard University on "The Danger to the Maintenance of High Standards from Excessive Formalism." President Lowell describes the present tendency in the training of nurses and the inspection of training schools so aptly that I quote at some length:

"My concern is the rules adopted at the joint meeting last March of the Association of American Colleges and the Council of the American Medical Association about the courses to be taken in college." . . . "We

are to ask not what a man knows, but whether the man has taken a course with a fixed number of lectures and laboratory work." . . . "You are using a rough mechanical test which is inaccurate on both sides, instead of a personal test which would be far more accurate." . . . "Americans are a mechanical people who trust to machinery to do their work, maintain standards and save labor. But mechanical devices as applied to human beings are apt to be defective, and in education they present, at the present time, a real danger. This runs from the top to the bottom of the educational scale." . . . "Our processes of education are inelastic, and if adapted to the ordinary person are hampering to the unusual mind. Is not this because we fix our attention too exclusively on the process, instead of on the result produced?"

It is to be hoped that the physicians of Massachusetts will post themselves thoroughly as to the present tendencies in the registration of nurses, that they will consider the needs of all of their patients rather than the needs of the well-to-do simply, and will join hands in an effort to provide reasonably safe nursing for the sick and suffering of all classes. Meanwhile, let us wait.

Very truly,
CHAS. H. COOK, M.D.

THE HARVARD MEDICAL SCHOOL OF CHINA.

PHILLIPS BROOKS HOUSE,

CAMBRIDGE, MASS., March 11, 1914.

Mr. Editor: This letter is intended to put the graduates of the Harvard Medical School in touch with the medical work recently inaugurated in Shanghai, China, by a group of graduates of the School.

The "Harvard Medical School of China" was established in Shanghai China, in 1913; and now has twenty-three students, a faculty of ten instructors, and occupies an excellent group of buildings, supplied free of rent for a period of years by the Chinese Red Cross Society. It is already a "going concern," and the opportunities before it for "service," which is its underlying motive, are great.

The purposes of the school are: (1) To teach modern medicine and surgery to Chinese students, and to assist in training leaders in the progress of modern medicine throughout China; (2) To coöperate with the Chinese government in inaugurating a greatly needed hygienic reform, in order to prevent epidemics spreading from there to other parts of the world; and (3) To study the diseases found in the Orient that threaten periodically the health of Occidental peoples. such as Bubonic Plague, Cholera, Leprosy, Filariasis, etc.

The work has advanced to its present stage on an annual budget of $25,000. We now face the necessity of the erection of our new hospital, and the establishment of an out-patient department. The money is already promised for the hospital building, but we need $30,000 for the purchase of the land. For the establishment of the out-patient department we are needing $5,000. An increase of $20,000 annually to our budget is also imperative.

We are now seeking for single subscribers to the above needs, and for others who will agree to become annual supporters for a period of five years. Checks for any sum will be gratefully acknowledged. It should be stated that it is expected that the work of the institution will ultimately be taken over entirely by the Chinese. We are pioneering, and helping to set standards that will govern in the great medical advance, of world-wide importance, to take place throughout the Orient.

It is believed that, as a work of Relief, of Education, of Research, and of Prevention, it calls for the deep interest and support of Harvard men. We will with pleasure forward reports of the work to those who, at this time, are unable to take an active part, as well as to any other persons whose names you may suggest.

Very truly yours,
MARTIN R. EDWARDS, M.D.

A CORRECTION—TONSILLITIS NOT AN AIR-BORNE DISEASE.

State Board of Health, Boston, March 21, 1914.

Mr. Editor: In the issue of your JOURNAL for March 12, page 399, it is stated, concerning the recent tonsillitis epidemic in Wakefield, that "the milk and water supply have both been decided not to be the source of infection, which in this case, as is probably usually the fact, is considered to be air-borne."

This statement is erroneous, inasmuch as investigation by Dr. Frank L. Morse, State Inspector of Health, has shown that this epidemic was, with practical certainty, due to an infected milk supply, pasteurization of which was followed almost immediately by a cessation of the epidemic. Furthermore, I should question seriously any statement that the disease is probably "air-borne." In fact, all the evidence goes to show that the original infection in these epidemics arises either in some abnormal condition in the cows, or, what is more probable, in a severe tonsillitis affecting some person engaged in handling the milk.

Yours very truly,
MARK W. RICHARDSON, M.D.

CHANGES IN THE MEDICAL CORPS, U. S. NAVY, FOR THE WEEK ENDING MARCH 14, 1914.

March 4, P. A. Surgeon D. G. Allen, from Newport Hospital to Training Station, Newport, R. I.

March 5, P. A. Surgeon F. M. Munson, to Mare Island Hospital.

March 9, P. A. Surgeon R. W. McDowell, detached Naval Academy, Annapolis, Md., to wait orders at Annapolis, Md.

March 10, Surgeon A. W. Dunbar, from Washington Hospital to Fleet Surgeon, Atlantic Fleet.

P. A. Surgeon E. L. Woods, Naval Hospital, Washington, D. C.

Assist. Surgeon A. R. Barrow, to Training Station, Newport, R. I.

Surgeon Edgar Thompson, from Guantanamo Station, to Washington Hospital.

Assist. Surgeon N. McClelland, from Charleston Yard to *Hartford*.

March 12, Surgeon E. M. Shipp, from Yokohama Hospital to Puget Sound Hospital.

P. A. Surgeon F. E. Porters, from *Rainbow* to Yokohama Hospital.

Assist. Surgeon J. G. Omelvena, from Cavite Station, to home, wait orders.

Assist. Surgeon J. V. Howard, from Canacao Hospital, P. I., to home and wait orders.

Assist. Surgeon L. L. Pratt, from Olongapo Hospital, P. I., to home and wait orders.

NOTICES.

UNITED STATES CIVIL-SERVICE EXAMINATION. MEDICAL INTERNE. GOVERNMENT HOSPITAL FOR THE INSANE.

The United States Civil Service Commission announces an open competitive examination for medical interne, for both men and women, on April 8, 1914. From the register of eligibles resulting from this examination certification will be made to fill vacancies in this position in the Government Hospital for the Insane, Washington, D. C., at $900 per annum, with maintenance, and vacancies as they may occur in positions requiring similar qualifications, unless it is

found to be in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Graduation from a reputable medical college is a prerequisite for consideration for this position.

Both men and women will be admitted to this examination. Applicants must be unmarried.

Age, 20 years or over on the date of the examination.

Persons who meet the requirements and desire this examination should at once apply to the United States Civil Service Commission, Washington, D. C.

NEW YORK SKIN AND CANCER HOSPITAL

The governors of the hospital announce a course of Clinical Lectures and Demonstrations in the Out-Patient hall of the hospital on the following afternoons, at 4.15 o'clock.

"Syphilis," by Dr. Bulkley.

April 1. Primary lesions, genital and extra-genital—Innocent syphilis.

April 8. Early manifestations of syphilis.

April 15. Late manifestations of syphilis.

April 22. Marital and hereditary syphilis.

April 29. Treatment of syphilis.

"Cancer," by Dr. William Seaman Bainbridge.

April 30. Some practical phases of the cancer problem.

The lectures will be illustrated by cases, models colored plates, photographs, etc The course will be free to the Medical Profession, on the presentation of their professional cards.

F. HAAS, *Chairman of Executive Committee.*

SOCIETY NOTICES.

THE NORFOLK DISTRICT MEDICAL SOCIETY.—A regular meeting of the Society will be held at the Psychopathic Hospital, 74 Fenwood Road, Tuesday, March 31, at 8 p.m., sharp. Telephone, Brookline 4900.

Business.

Program:—

1. Presentation of Patients.
2. Demonstration of Charts.
3. "Remarks on Mania," Dr. E. E. Southard.
4. "Analysis of the Second Hundred Recoveries at the Psychopathic Hospital," Dr. T. H. Haines.
5. "The Incidence and Type of Hallucinations in Five Hundred Cases of Mental Disease, with Remarks on Their Differential Diagnostic Value in Dementia Precox and Manic-Depressive Insanity," Dr. A. W. Stearns.
6. "On the Influencility of the Will in Voluntary Admission," Dr. G. E. Eversole.
7. "Blood and Cerebrospinal Fluid Examinations at the Psychopathic Hospital," Dr. H. M. Adler.

BRADFORD KENT, M.D., *Secretary,*
798 Blue Hill Avenue, Dorchester.

BOSTON MEDICAL LIBRARY in conjunction with the SUFFOLK DISTRICT MEDICAL SOCIETY.—Medical section, meeting, April 1, 1913, at 8.15, at the Boston Medical Library.

PSYCHOTHERAPY.

Dr. J. J. Putnam, "The Present Status of Psychoanalysis."

Dr. L. Pierce Clark, New York, "Personal Experience in Psychotherapy."

Discussion opened by L. E. Emerson, Ph.D.; Richard C. Cabot, M.D.

E. W. Taylor, Chairman.

LESLEY H. SPOONER, *Secretary,*
260 Clarendon Street, Boston.

APPOINTMENT.

MR. ROBERT N. HOYT, '09, has just been appointed by the Corporation of the Massachusetts Institute of Technology to the position of special lecturer on Public Health Administration.

RECENT DEATHS.

DR. CHARLES BULLOCK, who died on March 16, at Arlington, Mass., was born in Providence, R. I., on March 16, 1836. He studied dentistry at Hartford, Conn., and began the practice of his profession in that city. In 1859 he removed to Cambridge, Mass., where he practised until his retirement in 1896. He is survived by his widow.

DR. JAMES N. BUTLER, who died recently in New York City, was born in 1861. After graduating from St. Francis Xavier College, he obtained the degree of M.D. from the Bellevue Medical School. Later he became a founder of the medical school of Fordham University, and its first dean. He was attending physician at St. Francis' Hospital and the Mission of the Immaculate Conception.

DR. MARCUS M. JOHNSON, who died on March 15 at Hartford, Conn., was born in 1843. He received the degree of M.D. in 1877 from New York University. He is survived by his widow and by one daughter.

DR. THEODORE R. WAUGH, who died on March 17 at Burlington, Vt., was born in 1847. He is survived by his widow and by one son.

DR. GEORGE MCNAUGHTON of Brooklyn, N. Y., died from cardiac disease on March 17, at the age of 57. He was born at Mumford, N. Y., and was graduated from Bellevue Hospital Medical College in 1878. He had practised in Brooklyn since 1881, and for five terms served as president of the Kings County Medical Society. Dr. McNaughton was a prominent specialist in diseases of women, and at the time of his death was visiting gynecologist to the Long Island College and Kings County Hospitals and consulting gynecologist to the Brooklyn, Jewish and Long Island State Hospitals.

DR. THOMAS W. MCMANUS of New York died from pneumonia on March 12, at the age of 48. He was a native of Brooklyn and was graduated from the College of Physicians and Surgeons, New York, in 1895.

DR. GEORGE O. WELSHMAN of Newark, N. J., a graduate of the College of Physicians and Surgeons, New York, in 1895, was instantly killed at East Orange on March 17 by a railroad train striking his automobile.

DR. TIMOTHEUS TAMINOSIAN, who died of pneumonia on March 13 in Boston, was born at Antioch, Turkey, in 1861. After graduating from the Central Turkey in 1884, and in 1895 received the degree of M.D. from the Jefferson Medical College. Since that time he had practised his profession in Boston.

BOOKS AND PAMPHLETS RECEIVED.

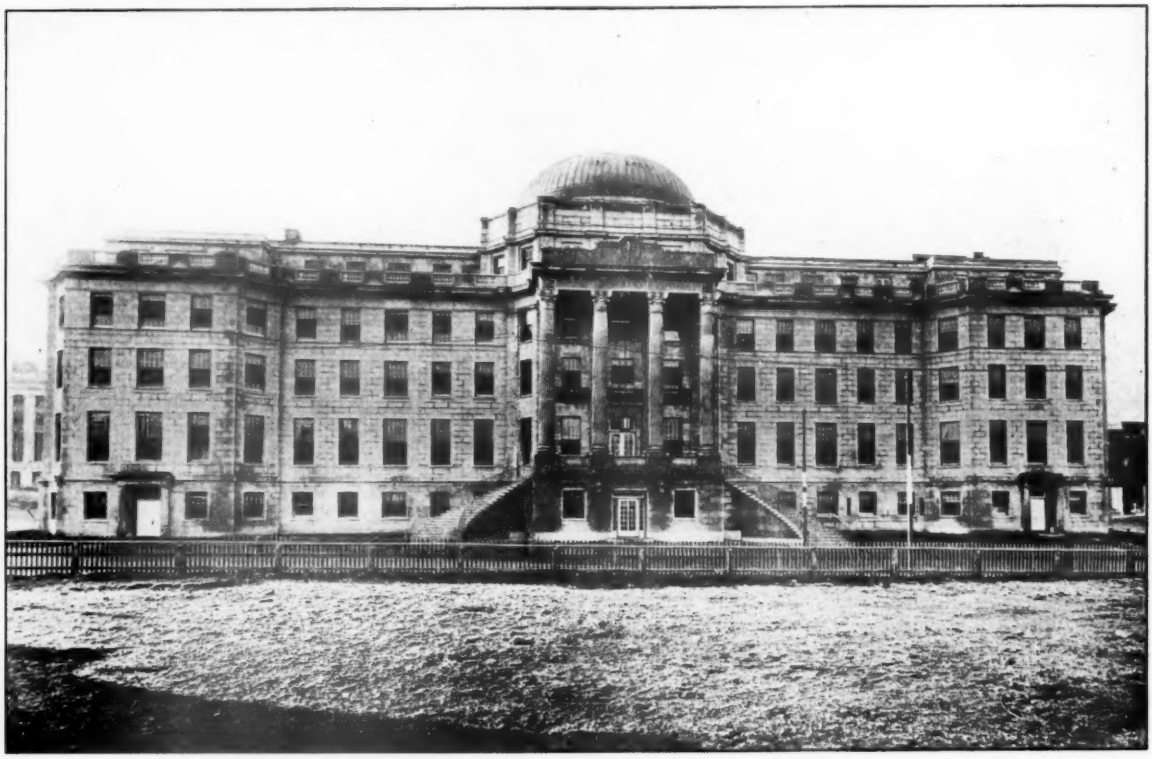
Diseases of Children. A Manual for Students and Practitioners, by John McCaw, M.D., etc. William Wood & Co. 1914.

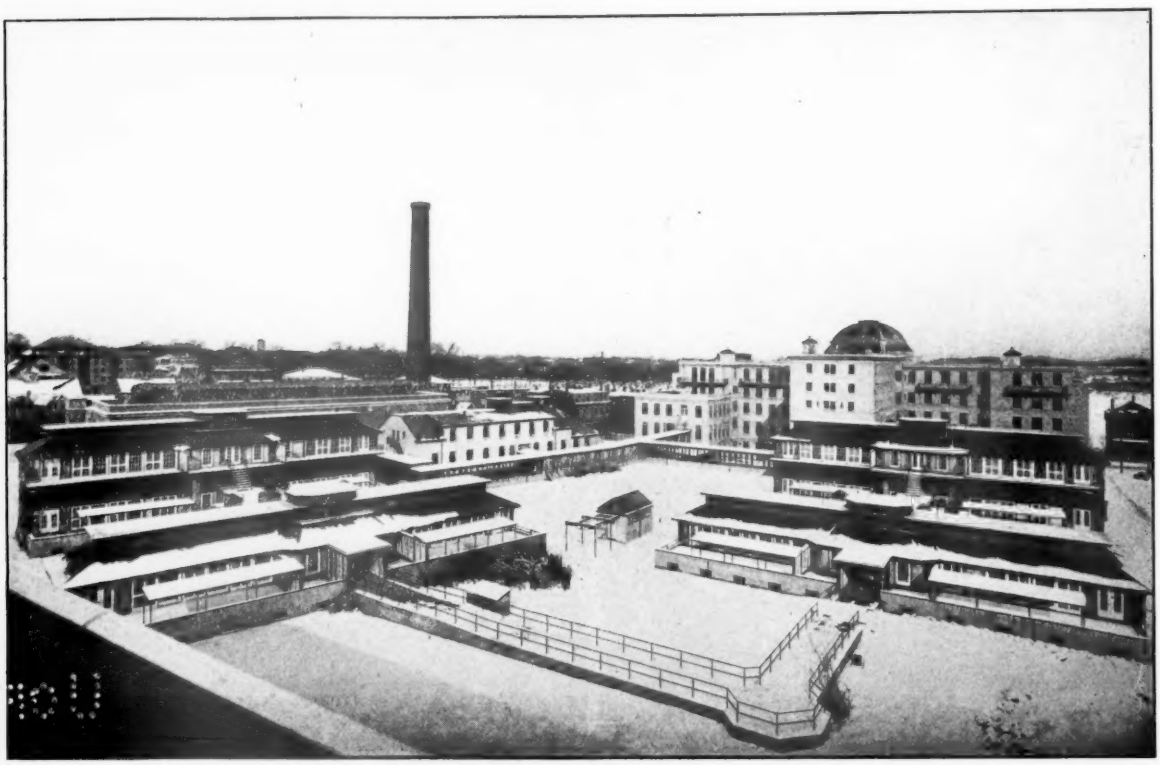
The Sensory and Motor Disorders of the Heart, Their Nature and Treatment, by Alexander Morison, M.D. William Wood & Co. 1914.

Transactions of the American Climatological Association for the Year 1913. Vol. xxix. Philadelphia. 1913.

Über Brüche des knöchernen Trommelfellrandes, ein Beitrag zur Unfall-Lehre von Prof. Dr. Heinrich Walb. Bonn, 1914. A. Marcus & E. Webers Verlag.

Organic Chemistry for Students of Medicine, by James Walker, LL.D., F.R.S. Gurney and Jackson. 1913.





CHILDREN'S HOSPITAL OF BOSTON.